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CHEYNE-STOKES RESPIRATION AND AURICULOVENTRICULAR CONDUCTION*

WILFRID J. COMEAU, M.D.†

BOSTON

THE association of changes in cardiac rhythm with the phasic breathing of Cheyne-Stokes respiration has been recognized for a number of years, and the variations in the cardiac mechanism which can occur during this disturbance of respiration have been discussed at length by Wassermann[12] and Wenckebach.[13] Although differences in cardiac rate are sometimes observed during the two phases of Cheyne-Stokes respiration, fundamental changes in auriculoventricular conduction have been infrequently reported and studied. Steele and Anthony[11] in 1933 reviewed this aspect of the subject, and noted only 16 cases in addition to the one which they presented; of these, only 8 were studied by electrocardiography. The present case is one in which such studies revealed that at times a marked interference with auriculoventricular conduction existed during the respiratory phase of Cheyne-Stokes respiration. The effect on auriculoventricular conduction of paralysis of the vagi by atropine sulfate was observed, and the results support the view that central vagal stimulation, probably as a result of anoxia, is fundamentally responsible for the appearance of delayed conduction.

ANOXEMIA AND CENTRAL VAGAL STIMULATION DURING CHEYNE-STOKES RESPIRATION

Although the pathogenesis of Cheyne-Stokes respiration resulting from heart disease has yet to be adequately explained, it is true that it is often associated with a deficiency in the oxygenation of the blood. Blood-gas studies by Anthony, Cohn and Steele[2] during Cheyne-Stokes respiration with anoxemia indicate that the lowest concentration of oxygen occurs at the beginning of the respiratory phase and gradually increases, to reach its highest level at the end of the dyspneic or the beginning of the apneic period.

The effect of an asphyxial state on the heart has been repeatedly studied in normal animals, and it seems certain that some degree of interference with auriculoventricular conduction is a constant result. It has further been shown by Mathison[8] that a deficiency of oxygen in the blood, rather than an accumulation of carbon dioxide, is primarily responsible for these conduction disturbances. Differences in the degree, duration and method of inducing asphyxia have led, however, to differences in opinion as to the manner by which anoxia produces its effect on the conducting mechanism. It is agreed that in the late stages of asphyxia the severe anoxemia exerts a direct effect on the myocardium which is primarily responsible for these functional changes. In the earlier stages, however, Greene and Gilbert[5] have offered convincing evidence that central stimulation of the vagi by anoxia is the fundamental mechanism by which a delay in conduction is produced. Further support is to be found in the work of Heymans[6] and others,[1, 7] who have demonstrated in animals that cerebral anoxemia or ischemia produces vagal stimulation. On the other hand, the observations of Resnik,[9] who studied asphyxia by a different method than Greene and Gilbert's, suggest that even in the early stages of an asphyxial state there is a direct effect on the myocardium sufficient to produce delayed auriculoventricular conduction. By correlating these observations it seems likely that as asphyxia progresses the direct effect of anoxemia on the myocardium, at first slight and of secondary importance to central vagal stimulation in the production of conduction disturbances, gradually becomes paramount and finally, owing to severe intoxication of the myocardium, displaces the vagi as the fundamental cause of the cardiac abnormalities.

Although it requires extreme degrees of as-

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phyxia to produce such results, it must be remembered that the above experiments were carried out on animals with normal hearts. As has already been pointed out, anoxemia of a lesser degree and duration in the presence of cardiac damage and the changes incident to heart failure might well produce similar disturbances of function. Even if anoxemia is not actually present, the heart muscle may suffer from anoxia as a result of atherosclerosis of the coronary arteries. Consequently in view of the experimental evidence on asphyxia, and of the fact that during heart failure there exists a relative state of continuous anoxemia, it is not surprising that the acute reduction of circulating oxygen which may occur as a result of the apneic period of Cheyne-Stokes respiration induces disturbances in auriculoventricular conduction.

That such changes of conduction are produced primarily by central vagal stimulation rather than by the direct effect of anoxemia on the myocardium is supported by both direct and indirect evidence. In the present case, paralysis of the vagi by atropine abolished the changes in cardiac rhythm without altering the character or degree of Cheyne-Stokes respiration. Of further interest is an experiment by Roth[10] in which changes in cardiac rhythm which were occurring spontaneously during the respiratory phase were induced by carotid-sinus stimulation during the apneic period. In addition to anoxemia in these cases the effect of digitalis as a factor in influencing vagal tone must be considered. Ferris, Capps and Weiss[4] have shown that digitalis markedly increases the sensitivity of the carotid-sinus reflex. It is not unlikely, then, as others[11] have emphasized and as seems true in the present case, that the action of digitalis may be an important factor in sensitizing the nervous and cardiac mechanisms, so that effects initiated by the anoxemia of Cheyne-Stokes respiration take place much more readily in the presence of this drug.

That the delayed conduction in these cases is produced through nervous pathways is further supported by the fact that variations in physiologic activities during Cheyne-Stokes respiration are not confined to the heart. As Wassermann[12] has pointed out in his comprehensive clinical studies on Cheyne-Stokes respiration, periodic differences in a number of reflexly controlled functions, particularly those governed by the autonomic nervous system, may coincide with the two phases of respiration. Differences in the size of the pupils, in vascular tone, in the level of the blood pressure and in the activities of the bladder and intestines have been observed to correspond with the periodicity of the respiration. Even the higher centers may be affected and periodic variations in psychic and motor activities may occur. In view of these widespread effects on reflexly controlled functions and the direct evidence that the vagi are concerned in the production of cardiac disturbances during Cheyne-Stokes respiration, there would appear to be little doubt that the functional changes in the heart and elsewhere are primarily produced through nervous pathways and probably by the central action of anoxemia.

CASE REPORT

E. B., a 51-year-old woman, was admitted to the Boston City Hospital on September 1, 1935, and died on September 24, 1935.

As a result of scarlet fever and bilateral otitis media there had been marked deafness since the age of 13. In 1933 bronchial asthma was diagnosed after allergic studies at the Beth Israel Hospital in Boston. This was completely relieved by the avoidance of certain allergic materials. At that time her blood pressure was found to be high (210 systolic) and she was advised to reduce her weight. In the following two years she lowered it from 195 to 145 pounds.

The patient stated that she had been in good health until February, 1935. At that time dyspnea on exertion and orthopnea developed and became progressively worse. In May, 1935, she began experiencing substernal oppression on exertion, which was relieved by 5 to 20 minutes of rest; a few weeks after its onset she suddenly awoke one night with a severe attack of dyspnea, which gradually subsided after she had sat upright for over an hour.

Following this attack she was sent to the Peter Bent Brigham Hospital, where an enlarged heart, pulmonary congestion and a large, tender liver were found. The electrocardiogram at this time showed ventricular premature beats from varying foci, left-axis deviation and a normal Lead 4. While in the hospital the patient experienced an attack of substernal oppression which was diagnosed as coronary thrombosis. After 7 weeks she was discharged with a diagnosis of chronic myocarditis and coronary thrombosis. She was advised to continue taking digitalis, 1½ and 3 gr. on alternate days.

She remained in bed at home until 3 weeks before entering the Boston City Hospital. On attempting an ambulatory regime she immediately began to fail. Weakness, a dry cough, severe attacks of paroxysmal nocturnal dyspnea, and crampy abdominal pains unassociated with exertion and not relieved by rest developed, and the dyspnea and orthopnea recurred. There had been no peripheral edema, pleurisy or hemoptysis. The patient had continued taking digitalis as described above, but during the 3 days preceding entry she had taken 6 gr. daily on the advice of her family physician. There were no symptoms of digitalis intoxication.

Physical examination revealed a thin woman who appeared both acutely and chronically ill. She was moderately orthopneic and there were slight cyanosis of the mucous membranes and engorgement of the cervical veins. The heart was enlarged, with the apex impulse 11.0 cm. to the left in the fifth intercostal space (midclavicular line 7.5 cm.). The heart sounds were of poor quality and there was a protodiastolic gallop rhythm with occasional premature beats. The cardiac rate was 85. No friction rub or murmurs were present. The blood pressure was 120/80.

A well-marked pulsus alternans was present. There were crepitant rales at the bases of both lungs. The liver was felt 6 cm. below the costal margin and was slightly tender. There was no peripheral edema. Other than marked bilateral deafness, no abnormalities were present.

The urine, red-blood-cell count and hemoglobin were normal. The leukocyte count varied from 11,000 to 15,000, with an occasional higher value. The blood nonprotein nitrogen was 35 mg. per cent. The blood Kahn reaction was negative. X-ray films of the chest on September 3 (portable unit) showed cardiac enlargement in the region of the left ventricle, and pulmonary congestion.

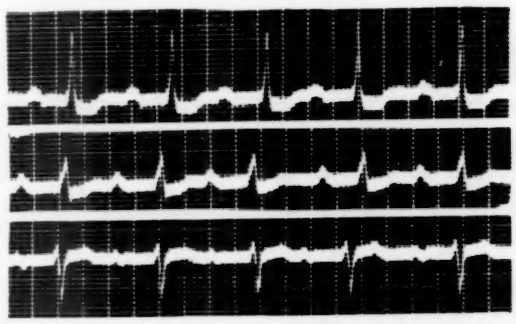

Figure 1. *Electrocardiographic Record Showing the Three Classical Leads (September 12, 1935).*

Routine electrocardiograms were taken on September 4, 9, 12 (Fig. 1), 18 and 23. The cardiac rate varied between 77 and 83 beats per minute. There was delayed auriculoventricular conduction in all tracings, the P-R interval ranging from 0.22 to 0.32 sec. The Q-S interval changed from 0.08 to 0.10 sec. between the third and fourth tracings. All records showed sagging of the S-T segment in Lead 1 and slight sagging in Lead 2. Slight to moderate left-axis deviation was present. Lead 4 was normal on each occasion. An unusual change occurred in the P waves in all leads of the final record; although formerly normal in shape, they became markedly broadened and notched in the record of September 23.

During the first 19 days in the hospital there was slow but gradual improvement in the patient's symptoms and physical signs. The temperature, which had fluctuated between 100 and 101°F., dropped after the first 6 days and remained between 97 and 98°F. until 5 days before death. A daily dose of 1½ gr. of digitalis was given from the time of entry. Bed rest and symptomatic treatment were the only therapy. During the latter part of the 2nd week, Cheyne-Stokes respiration of a marked degree appeared and continued intermittently until death. The patient was not conscious of any respiratory difficulty during these episodes, which sometimes lasted several days. On September 20 she developed a severe pleuritic pain in the right chest and her temperature rose to 101°F. Rales and signs of fluid developed at the base of the right lung. On the following day a pleural friction rub and increased rales were noted on the left side of the chest. During the final 3 days of illness the patient had a severe cough with blood-tinged sputum. She failed rapidly, and on September 24 she went into shock following severe abdominal pain in the left lower quadrant and died 15 minutes later.

At autopsy, the heart, which weighed 540 gm., was markedly dilated. The pericardium was normal. There were no thrombi in either auricle. The ventricular myocardium measured 1.4 cm. in thickness on the left and 0.5 cm. on the right. There were many thrombi adherent to the walls of both ventricles. Although moderate patchy atherosclerosis of the coronary arteries and the aorta was present, the former vessels were not constricted and were patent throughout their entire visible course. Microscopically there were many small fibrous scars with lymphocytic infiltration scattered throughout the myocardium of both ventricles.* These were most numerous near the endocardium, which was slightly thickened. Slight atherosclerosis of the smaller arteries was present. Examination of the lungs showed an infarct of moderate size in the right middle lobe and several smaller ones in both lobes of the left lung. Both pleural cavities contained 300 cc. of light yellow fluid. The liver and spleen were enlarged and congested, the former weighing 2140 gm. and the latter 280 gm. The remainder of the abdominal examination was negative, and no cause could be found for the terminal abdominal pain.

OBSERVATIONS

Cheyne-Stokes respiration was first noted on September 11, each phase of respiration lasting from 20 to 25 seconds. Following periods of apnea the respirations gradually increased both in depth and frequency until a rate of approximately 30 per minute was reached. The respirations then decreased until apnea again supervened. September 11 was the only occasion on which a sudden halving of the pulse rate occurred as the respiratory phase appeared. This slowing continued until shortly before the next period of apnea. During some respiratory cycles, however, no change in the cardiac rate was noted. Electrocardiographic studies at this time revealed that one of two changes in auriculoventricular conduction was taking place during each cycle.

The first change was delayed auriculoventricular conduction during apnea (P-R equal to 0.36 second), and as the respiratory movements were resumed there usually occurred a sudden change to 2:1 partial heart block (Fig. 2*B*). It is of interest to note that the P-R intervals of the conducted auricular beats rapidly decreased from 0.34 to 0.22 second, and were maintained at that level until the approach of apnea, when there was a sudden resumption of 1:1 rhythm with a P-R interval of 0.36 second. The auricular rate remained essentially unchanged at 75 per minute during both phases of the Cheyne-Stokes respiration, although occasionally the rate varied for several beats, with limits of 63 and 83 per minute. Premature or escaped ventricular beats were observed during both rhythms, and also occurred during some of the routine records.

The other change which occurred was tran-

*The pathogenesis of the myocardial scarring is not clear. It seems unlikely, in view of the type and distribution of the scars and the degree of atherosclerosis, that the coronary artery disease alone was the responsible factor, although it is conceivable that the scarring may have been the result of myocardial degeneration due to anoxia brought about by a combination of coronary atherosclerosis, functional coronary insufficiency due to the cardiac enlargement, and chronic heart failure.

sient complete auriculoventricular dissociation with a relatively rapid ventricular rate (Fig. 2*A*). The auricular rate varied from 73 to 88 per minute during both phases of the Cheyne-Stokes respiration, while the ventricular rate remained constant at 83 per minute during the respiratory period. There was in addition an alteration in the ventricular complexes during complete dissociation, with slurring, notching and widening of the QRS complexes (Q-S equal to 0.15 second). During the entire period of observation in which eight cycles of Cheyne-Stokes respiration were studied by electrocardiography, 2:1 heart block occurred six times and complete auriculoventricular dissociation twice.

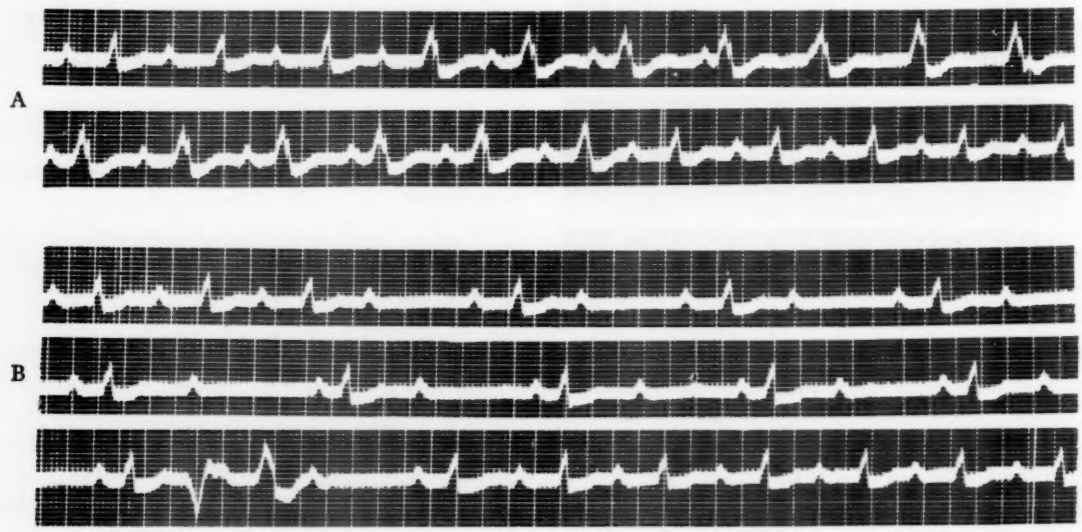

Figure 2. *Records (Lead 2) Taken during Two Cycles of Cheyne-Stokes Respiration (September 11, 1935).*

A. The top strip shows the transition, with the onset of the respiratory phase, from partial auriculoventricular dissociation to complete auriculoventricular dissociation. The bottom strip shows the reverse transition as apnea developed.

B. A continuous strip which began at the end of an apneic period of Cheyne-Stokes respiration, extended through an entire respiratory phase and ended at the onset of the succeeding period of apnea. The transition to and from 2:1 partial heart block is shown. Note the decreasing length of the P-R intervals of the conducted auricular beats during 2:1 partial heart block as the respiratory phase developed. Two escaped beats of ventricular origin occurred during 2:1 partial heart block just prior to the transition to a 1:1 rhythm.

The effect of paralysis of the vagi by atropine sulfate was not observed until the following day when, although Cheyne-Stokes respiration persisted, marked changes in auriculoventricular conduction had ceased. There was, however, a slight lengthening of the P-R interval during the respiratory period. During apnea the P-R interval ranged from 0.28 to 0.30 second (Fig. 3*A*), while during the respiratory phase it varied between 0.30 and 0.34 second (Fig. 3*B*). Two milligrams of atropine sulfate was injected intravenously and electrocardiographic tracings were taken periodically for fifteen minutes. A strip taken during the second minute after the completion of the injection of atropine revealed that the P-R interval had been reduced to 0.20 second (Fig. 3*C*) through both phases of respiration until the observations were completed. There was only a slight increase in the ventricular rate after paralysis of the vagi, the cardiac rate before injection being 75 to 80 beats per minute, while during the effect of the drug it was 85 beats per minute. The atropine produced no effect on the Cheyne-Stokes respiration.

DISCUSSION

The fact that a slight degree of partial auriculoventricular dissociation was present in the routine records and persisted during apnea indicates that the auriculoventricular conduction was in a continual state of depression as a result either of digitalis or of changes in the junctional tissue incident to heart failure, partial fibrosis or both. The results with atropine suggest that this was in all probability not due to tissue changes, for had these been primarily responsible, the delay in conduction would not be expected to have remained constant or even to increase with the acceleration in cardiac rate during the atropine effect.[3] In view of the known vagotonic property of digitalis it seems reasonable to assume that the conducting mechanism was continuously under

the effect of an abnormal degree of vagal stimulation as a result of this drug.

Of interest is the gradual decrease in the P-R intervals of the conducted impulses during 2:1 heart block, and finally the transition to a 1:1 rhythm, with a moderately prolonged P-R interval as the only remaining evidence of interference with auriculoventricular conduction. This is commonly found when delayed conduction in 1:1 rhythm gives way to 2:1 block, and is to be explained by the gradual improvement in conduction as a result of the longer diastolic rest periods during the 2:1 rhythm. In this case the gradual decrease in vagal tone as a result of progressive oxygenation of the blood may possibly have been an additional factor.

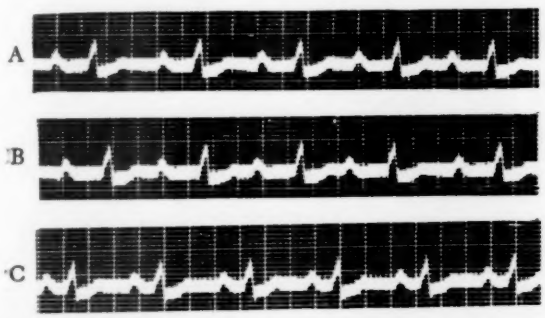

Figure 3. *Records (Lead 2) Taken during Atropine Observations (September 12, 1935).*

A. Control strip taken during the apneic phase (P-R interval, 0.28-0.30 sec.).

B. Control strip taken during the respiratory phase (P-R interval, 0.34 sec.).

C. Strip taken after the injection of 2 mg. of atropine sulfate (P-R interval, 0.20 sec.).

Most likely owing to an unusually high degree of anoxemia, occasioned possibly by a particularly prolonged period of apnea, there occurred vagal stimulation of a degree sufficient to cause the block in the region of the auriculoventricular node to exceed 2:1. Thus the rate of the conducted auricular beats fell to a very low level or they were completely blocked; as a result the ventricles assumed their inherent protective role by establishing an idioventricular rhythm and thereby maintaining adequate cardiac function. Irritability of the ventricular myocardium was evidenced by ventricular premature beats both in the presence and absence of Cheyne-Stokes respiration and ventricular escape during 2:1 heart block. This irritability of the myocardium was fully as important as was vagal depression of the junctional tissue in the production of the complete auriculoventricular dissociation, for it allowed ventricular escape to take place easily and accounted for the rapid idioventricular rate,[14] which is not seen in complete heart block due to organic changes in the conducting tissue.

Finally, the abnormal type of QRS complex which was present during complete auriculoventricular dissociation merits brief discussion. Although these changes in the ventricular complexes might be considered as evidence of the temporary development of a defect in bundle-branch conduction, such a genesis is unlikely. In view of the fact that vagal stimulation has little if any direct effect on the bundle branches,[3] and since it is believed that vagal stimulation was primarily responsible for the production of the complete auriculoventricular dissociation, it is more likely that the idioventricular rhythm (ventricular escape) was originating in an irritable focus situated in one of the bundle branches and thus produced QRS complexes resembling bundle-branch block.

SUMMARY

The relation of anoxemia and central vagal stimulation during the periodic breathing of Cheyne-Stokes respiration and their role in the development of functional changes in the heart are discussed.

A case is presented of a woman of fifty-one with heart failure and recurrent Cheyne-Stokes respiration, postmortem examination showing that there were many disseminated microscopic scars in the myocardium of both ventricles. That the scarring resulted from coronary atherosclerosis alone seemed unlikely.

Electrocardiographic observations during a period of Cheyne-Stokes respiration showed that during the respiratory phase there occurred sudden transitions in the cardiac rhythm from a slight degree of partial auriculoventricular dissociation to either 2:1 partial heart block or complete auriculoventricular dissociation with a relatively rapid ventricular rate. Paralysis of the vagi by atropine sulfate during a subsequent period of Cheyne-Stokes respiration, when the changes in auriculoventricular conduction were less marked, produced a return to normal conduction in both phases of respiration without altering the character of the respiration.

The interplay of the vagotonic effect of digitalis, irritability of the junctional tissue and the effects of vagal stimulation on the conducting function of the heart is discussed in relation to the various electrocardiographic abnormalities occurring in the present case.

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LUNG ABSCESS DUE TO ESOPHAGEAL OVERFLOW*

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BOSTON

THE following case is so unusual and the lesson that it teaches is of such importance that it was considered to be worthy of record and discussion.

CASE REPORT

J. F. (No. M39020), a 40-year-old, Italian-born waiter, was admitted to the Peter Bent Brigham Hospital May 15, 1931. For 5 or 6 winters he had had spells of coughing which lasted 2 or 3 weeks. Nine months before coming to the hospital he began to have a severe cough, and every day he raised from 1 to 3 cupfuls of foul sputum, watery or thick and usually yellowish or greenish. Almost every morning after coughing once or twice he vomited, without nausea, food eaten the preceding night — the food was recognizable and practically unchanged; after vomiting he was able to eat as heartily as ever. Six weeks after the onset of the severe productive cough the patient suddenly coughed up about 8 teaspoonfuls of blood-streaked sputum; following this event, blood-streaked sputum was of common occurrence throughout the winter. Because of the increasing severity of the cough and expectoration, with weakness, of the loss of 13 pounds in weight and of pain in the right anterior chest on inspiration he came to the outpatient department and was immediately admitted for investigation and treatment. The past and family histories were, according to the records, noncontributory.

Physical examination showed a wasted, sick-looking man, with a putrid breath and frequent cough productive of large amounts of thick, foul-smelling sputum. There were diminished descent of the right diaphragm and a small area of dullness posteriorly just below the angle of the right scapula, with increased breath sounds and voice sounds and crepitations in this region on coughing. There were no abnormal findings anteriorly, and the physical examination was otherwise negative. Laboratory studies showed a moderate secondary anemia; the white blood-cell count was 17,000, 79 per cent polymorphonuclears. The urine and stool examinations and the blood Wassermann test were negative. He raised between 30 and 300 cc. of sputum daily; it was greyish-green, occasionally blood-streaked and, on standing, separated in such a way that it was apparent that about 40 per cent consisted of pus.

A roentgenogram of the chest (Fig. 1) on admission showed an irregular dense area suggesting consolidation in the right middle lobe; this area contained several small areas of calcification. The septum between the middle and upper lobes was thickened, and the process apparently penetrated it into the base of the right upper lobe. There were several adhesions involving the right diaphragm. The findings suggested a chronic inflammatory process. Films taken after the instillation of lipiodol failed to show evidence of cavity formation.

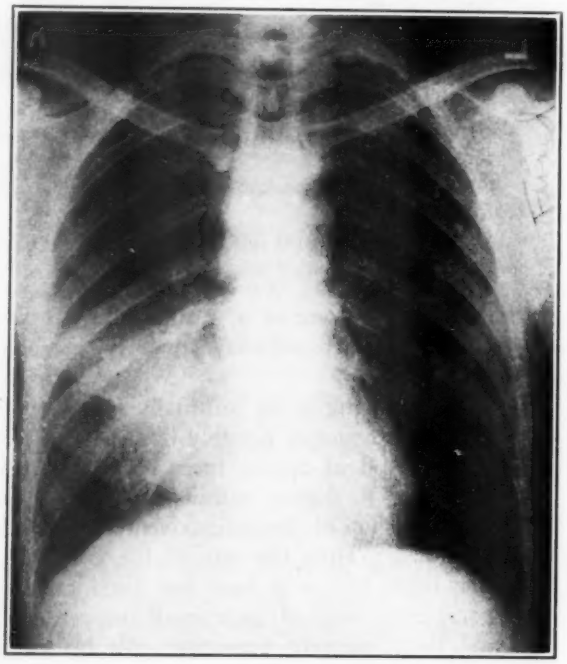

Figure 1. *Roentgenogram Taken on May 15, 1931.*

There is an area of consolidation in the middle lobe that extends up into the base of the upper lobe. Note the small areas of calcification in the area of consolidation.

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Repeated examinations of the sputum failed to reveal the presence of tubercle bacilli. Five weeks after entry, however, spirochetes and fusiform bacilli were found, so a course of treatment with arsphenamine was instituted. A few days later roentgenographic examination of the chest showed definite locular cavity formation, which replaced most of the consolidation (Fig. 2). From this time on

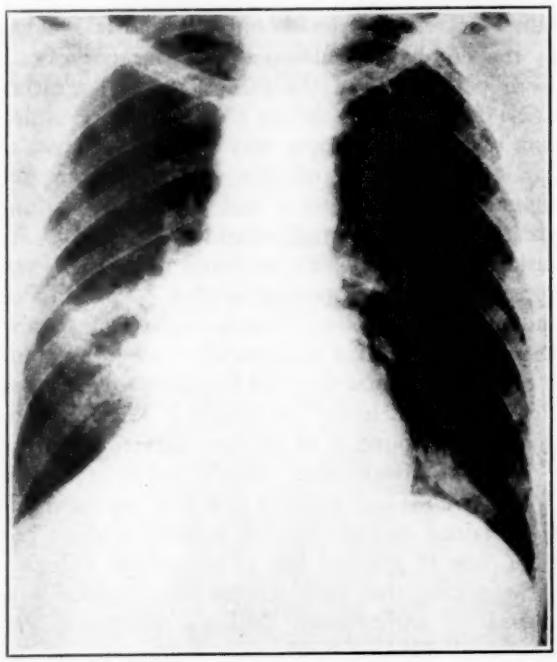

Figure 2. *Roentgenogram Taken on July 20, 1931. A definite cavity is present. The increased markings at the left base suggest a spread of the involvement.*

the progress of the patient was satisfactory; the pneumonitis surrounding the cavity cleared, and he was discharged from the hospital in August, 3 months after admission. He was followed in the outpatient department where arsphenamine treatment was continued until he became symptom-free in the autumn, with a return to normal weight and strength. A roentgenogram taken in February, 1932, showed scattered areas of fibrosis in the right lower lobe; the cavity was still clearly visible but free from any surrounding pneumonitis. The calcified body previously observed lay at the bottom of the cavity, apparently loose within it. The patient was not seen again until September, 1935, at which time the appearance of the chest was unchanged except that the calcified body seemed to be adherent to the roof of the cavity.

In December, 1937, the patient returned complaining of a gnawing epigastric pain that occurred about an hour after meals and was relieved chiefly by milk or soda. This had been present for 2 months. He also stated that every evening he vomited large quantities of food which had been eaten several hours previously. The vomitus was sometimes blood-streaked but never looked like coffee-grounds. In spite of a good appetite he had been unable to retain anything except milk and had lost 10 pounds in weight. A roentgenogram showed the cavity in the right lung to be unchanged, but the calcified body had again shifted in position; it was concluded that the latter represented a pneumolith or "lung stone." There was a considerable amount of coarse mottling in the lower half of the left lung suggesting bronchopneumonia or bronchiectasis. Gastrointestinal studies revealed obstruction of the lower end of the esophagus; only a small quantity of barium trickled through it during the course of several hours. The esophagus was enormously dilated and filled with retained material (Fig. 3); a diagnosis of cardiospasm was indisputable.

The question arose as to whether there was any causal relation between the pulmonary suppuration and the cardiospasm. The marked dilatation of the esophagus suggested cardiospasm of many years' duration, and the information found in the original hospital record — that each morning the patient had vomited the food eaten the preceding evening — indicated that the condition had been present before the onset of the pulmonary infection. With this in mind, further information was obtained from the patient. It was learned that as early as 1916 he had experienced a sharp catching pain after meals, with a feeling of constriction

Figure 3. *Roentgenogram Taken on December 7, 1937. This is a left lateral view of the chest, taken six hours after the ingestion of barium. Note the large quantity of barium remaining in the esophagus, which is also filled with supernatant fluid that displaces the trachea anteriorly. The old abscess cavity is still plainly visible.*

in the lower sternal region, and he frequently vomited bitter watery material and, in later years, undigested food eaten many hours previously. A roentgenological diagnosis of cardiospasm had been made in 1920 in Italy. Therefore it seems justifiable to conclude that overflow of the obviously infected, retained esophageal contents

(probably during sleep — the patient always slept on his back) had been the cause of the pulmonary suppuration.

Cardiospasm is not generally recognized as a cause of lung abscess. That this is due to its apparent infrequency is obvious. Freedman[1] did not find cardiospasm or other esophageal abnormality in his series of 276 cases of lung abscess at the Boston City Hospital during the period 1926 to 1935, in which there were no cases of unexplained origin. Maxwell,[4] who made an intensive study of the etiology of pulmonary suppuration based on the postmortem findings in 315 cases at St. Bartholomew's Hospital, London, from 1907 to 1931, records no instance in which the lesion was secondary to esophageal overflow. Neither is the possibility of such a cause raised in his discussion, although there were 16 cases of lung abscess without evident cause. Warner[13] found the incidence of idiopathic lung abscess to be 33 per cent in a series of 98 cases at the Toronto General Hospital; esophageal abnormality was not mentioned as a possible cause. The case cited herewith is the only one in the files of this hospital in which the two conditions are associated. Our records include, however, many idiopathic cases; that cardiospasm may have been present though unsuspected is quite possible, for only in rare instances were gastrointestinal studies carried out. In other words, we have failed to realize that the escape of retained esophageal contents into the lungs may be responsible for abscess formation.

Nevertheless the literature contains evidence that pulmonary complications can be caused in this way. Thomas and Jewett[11] reported the autopsy findings in a thirty-two-year-old male who had a greatly dilated esophagus due to cardiospasm and died of a bilateral pneumonia. He had been receiving feedings of cream as part of a high-caloric diet; histological examination showed the pneumonia to be of the type produced experimentally in animals by instilling oil into the lungs. Vinson[12] cited a case of cardiospasm with lung abscess that was considered to be due to regurgitation and aspiration of food and mucus. The cardiospasm, which had been present for ten years, was cured by dilating the esophagus, and the abscess resolved after bronchoscopic aspiration. Other cases of lung abscess associated with cardiospasm have been seen by Steinberg[9] and by Strieder.[10] Mallory[3] reported a case of cardiospasm with pneumonic consolidation and abscess formation due to aspiration of material from the esophagus and made the statement that this is not an uncommon complication in esophageal stricture.

Likewise esophageal obstruction or retention due to other causes may result in lung abscess. Cases in which a foreign body in the esophagus was responsible were reported by Nicolaysen,[5] Pardal[6] and Sergent and Poumeau-Delille.[8] We have not seen pulmonary complications associated with benign stricture of the type produced by corrosives, but this is within the realm of possibility. Keefer[2] pointed out that in carcinoma of the esophagus pulmonary complications occur from perforation of the tumor, glandular metastases, obstruction of the air passages, or the aspiration of food. His paper was based on 17 cases of carcinoma of the esophagus with pleural or pulmonary complications; it included 1 case of lung abscess due to aspiration of retained material. An instance of pneumonitis produced in this way was recently seen in a patient at this hospital. Pulmonary complications of such origin are probably more frequent than is generally recognized, and it seems likely that they are frequently overlooked. Pruvost and Leblanc[7] investigated a case of lung abscess and found it to be secondary to a pulsion (Zenker's) diverticulum which had produced no symptoms. They pointed out that aspiration of the retained contents of such a pouch is quite possible, due to gradual loss of the cough reflex.

Suggesting that lung abscess may frequently be caused by undiagnosed Zenker's diverticula Pruvost and Leblanc advocated routine search for such lesions in cases of unexplained lung abscess. They considered these diverticula as potential foci of infection, and in cases where pulmonary complications had not occurred, urged their early eradication as a preventive measure. The facts of the case reported herewith support their view. Unsuspected esophageal retention may be the cause of apparently unexplained lung abscess, and even in the absence of dysphagia, the esophagus should be investigated. The danger of this potential focus of pulmonary infection was also stressed by Thomas and Jewett.[11] They stated that if in cardiospasm the patient is constantly subjected to the risk of aspiration pneumonia it is advisable to recommend gastrostomy much earlier in the course of the disease than is customary.

SUMMARY

A case is presented in which cardiospasm had resulted in the formation of a lung abscess. Retention of esophageal contents may also be due to a foreign body in the esophagus, pulsion diverticulum, carcinoma of the esophagus or benign stricture. Overflow into the lung due to any of these conditions may be followed by pulmonary suppuration, including pneumonia, lung abscess and bronchiectasis. In cases of unexplained pulmonary suppuration the esophagus should be rou-

tinely studied, in spite of the absence of symptoms referable to it. In patients with esophageal retention without pulmonary complications delay in eliminating this potential focus of infection is dangerous: treatment as a preventive measure should be instituted early.

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A CLINICAL CHART FOR CHRONIC ARTHRITIS

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BOSTON

THE usual hospital record system which is geared to the tempo of acute diseases has certain obvious shortcomings when used to follow the clinical course of chronic arthritis. In order to eliminate these difficulties so far as possible, a supplementary clinical chart, especially designed to record the slow and gradual changes in the course of chronic arthritis, has been utilized at the Robert Breck Brigham Hospital during the past year. Since it has been found helpful in evaluating the effects of therapy as well as in simplifying the recording and interpretation of clinical observations and laboratory data, it is presented here.

The chart consists of a series of synchronized graphs. They combine on one sheet the data which at the present time at the Robert Breck Brigham Hospital are considered the most significant as criteria of changes in the status of the arthritic patient. These data are plotted in time periods, as is customary, but in months and years instead of in days and weeks. An adaptation of Nissen's[1] life-course chart for arthritics is included.

The chart measures eleven by sixteen inches, so that it can be inserted in a standard hospital record book when folded horizontally. The absence of a margin on the right permits the attachment of additional sheets. Divisions for seventeen months are provided on each sheet, and fine lines between them represent intervals of two weeks, the average shortest period between clinic visits for patients living at home. The filling in of the chart is started when the patient enters the hospital. We have found it valuable, when the past history is sufficiently accurate, to include data for several months prior to admission, and when possible from the onset of the first symptoms. Thus the completed chart becomes a record of the entire clinical course of the disease. In the hospital, it is filled in once a month by the attending physician. In the clinic, it serves as a useful outline for the interval history and physical examination. Laboratory work recorded on the chart at regular intervals during hospitalization is continued in the clinic when necessary.

In outline the chart provides for the following information:

Month of Disease. In this section the duration of the disease is indicated by the number of months which have elapsed since the onset of symptoms.

Location. Vertical lines are drawn at the time the patient changes his location, as from home to hospital.

Treatment. This section records the therapeutic agents employed. As the time divisions are too narrow for exact entries, it is necessary to list the separate dates of administration on the regular treatment sheets. When it is desired to evaluate the effect of therapy on the clinical course, vertical lines can be drawn through the chart at the beginning and end of a given period of treatment.

Events. This section records intercurrent events which possibly have an effect on the clinical course. Initials and abbreviations are used above blocked-in areas at the time when these events occur. Their complete description elsewhere in the record can be referred to by date.

Estimated Joint Involvement. This section provides a space for each joint except the individual finger and toe joints. The method of recording may be altered to meet the requirements of any form of chronic joint disease; the procedure found most satisfactory for cases of rheumatoid (atrophic) arthritis is as follows:

The joint involvement in this disease may be divided into active or acute involvement, where the presenting symptoms are pain, tenderness, swelling and heat; and

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quiescent or chronic involvement, where the symptoms are at a minimum and the various joint deformities predominant. Active joint involvement is shown by filled-in areas, within which smaller spaces permit a record of the degree of activity — mild, moderate, severe or extreme. A fine line in the lowest space indicates mild symptoms; as the symptoms increase a wider area is filled in. This method is subject to individual variations, but has been found sufficiently accurate for the purposes of this chart, namely to show the relation of joint activity to other data.

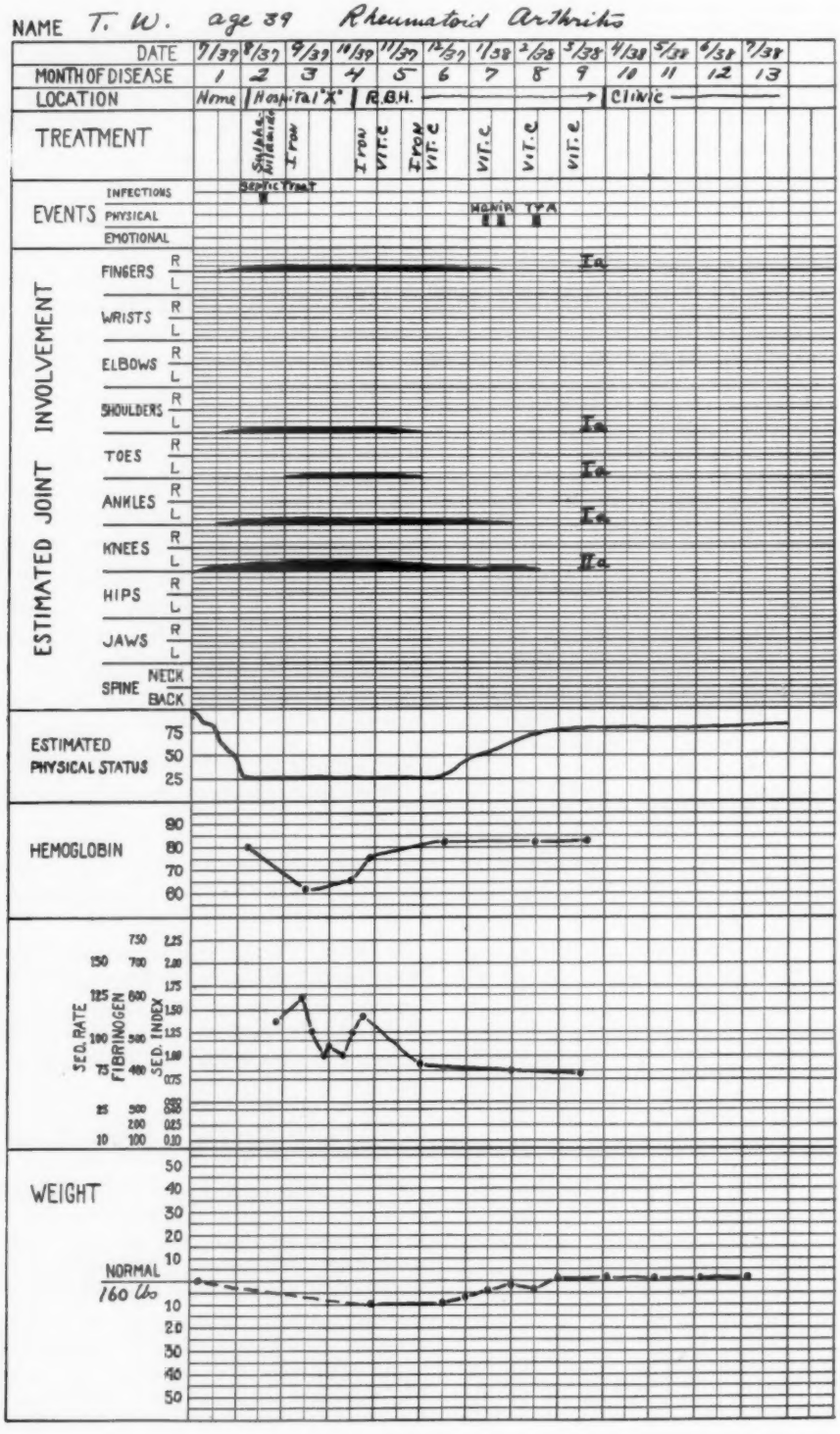

Figure 1.

In order that this section of the chart may present as complete a picture as possible of the joint involvement without preventing the desired emphasis on the symp-

toms of acute activity, the degree of existing deformity in the joints which do not show acute symptoms is recorded by symbols. It has been found practical to use in modified form Taylor's[2] table to indicate the degree of joint involvement.* The numerals and letters are placed in the space provided to indicate joint activity. In following a case during a long period of remission from acute symptoms, periodic estimations of the degree of involvement in separate joints by this objective method may show changes which might not otherwise be appreciated.

Estimated Physical Status. Scoring in this section is adapted from Nissen's[1] chart; 100 indicates that the patient is able to work at his usual trade; 75 that he is ambulatory; 50 that he is confined to bed and chair; 25 shows confinement to bed; and 0 indicates death. Since this clinical chart is necessarily more detailed than the life-course chart, the actual physical activity of the patient rather than his potential activity can be recorded. Thus the physical status of a patient who although ambulatory is confined to bed as a therapeutic measure is registered on the line indicating such confinement until he is allowed to get up.

Laboratory Findings. The hemoglobin graph is self-explanatory. The second space is so arranged that the sedimentation rate, the sedimentation index or the blood fibrinogen can be used as a gauge of activity. For convenience, the corresponding values of each are co-ordinated as closely as variation in method permits.

Weight. This graph is arranged for the tabulation of the number of pounds above and below the estimated normal of body weight. For growing children, adjustments can be made for gains in weight of more than fifty pounds by changing the base line.

*Taylor's table is essentially a method of classifying cases of chronic arthritis in respect to the average or predominant stage or degree of joint involvement. By permitting the inclusion of both clinical and x-ray criteria it supplies a means of tabulating, statistically, information which would otherwise require lengthy textual description. Adapting this system to our use, we have classified the clinical criteria of joint involvement in the following manner (x-ray criteria are utilized only when there are conflicting clinical opinions):

Stage 1. Periarticular swelling or crepitus but no limitation of motion.
Stage 2. Limitation of motion without marked destruction or displacement.
Stage 3. Subluxation. This stage is limited to the fingers, toes, knees and, rarely, shoulders and wrists.
Stage 4. Complete lack of articulation by reason of fibrous or bony ankylosis or extreme destructive changes, for example flail joint.

As suggested by Taylor, each stage is subdivided according to whether the involvement is (*a*) mild, (*b*) moderate, (*c*) severe or (*d*) extreme. For example, a joint with no limitation of motion and slight periarticular swelling would be in Stage 1*a*, a joint with moderate limitation of motion in Stage 2*b*, a subluxated joint with severe soft-tissue changes in Stage 3*c*.

Observations on the same patients recorded in this manner by different observers have agreed to a high degree of accuracy. Gross differences have occurred only when attempts were made to classify joints showing symptoms of acute activity. These errors are eliminated on our chart by recording the acute symptoms separately in the manner described.

Figure 1 illustrates a portion of a chart used for a patient who has partially recovered from a first attack of rheumatoid arthritis. The chart was started when he entered the hospital during the fourth month of his disease. It includes historical data from the onset of symptoms, following which he remained at home for one month and in another hospital for two and a half months. From the section on joint involvement it is seen that the first joint affected was the left knee, and that signs of activity gradually developed in the left ankle, left shoulder, fingers of right hand and toes of left foot. The symptoms gradually diminished, leaving residual signs of periarticular swelling but no limitation of motion in the fingers, toes and ankle involved. Slight crepitus but no limitation of motion was present in the shoulder; these joints were in Stage 1*a*, as indicated. The left knee was more acutely involved, and had slight limitation of motion, which placed it in Stage 2*a*. In the outside hospital sulfanilamide was given for a septic sore throat (indicated under "Events, infections"), which may have accounted for the drop in hemoglobin at that time. Iron was given until the hemoglobin returned to 80 per cent, and vitamin C tablets were given, since the blood cevitamic-acid level was found to be low. Two manipulations of the left knee and a tonsillectomy and adenoidectomy (indicated under "Events, physical") were done when signs of activity had reached their minimum. No other therapy was prescribed except the ordinary routine of bed rest, graded exercises, hot fomentations and protection of the joints. The hemoglobin rose following treatment with iron. The sedimentation index tended downward. The patient regained his former weight after a loss of 10 pounds. He is now ambulatory at home and returns to the clinic each month for checkup. No laboratory work has been deemed necessary since the patient's discharge from the hospital, as no symptoms of activity have occurred.

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SULFANILAMIDE IN UNDULANT FEVER*

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BOSTON

BLUMGART‡ has recently reported the recovery of a patient with undulant fever treated with sulfanilamide. He reviewed the literature and found reports by nine authors of 13 cases showing the effectiveness of this treatment. The experience with the following case confirms the therapeutic value of sulfanilamide and suggests a specific effect.

REPORT OF CASE

A 50-year-old lawyer presented himself at the Lahey Clinic on July 18, 1938, with a history of an afternoon fever of 6 weeks' duration. He had always enjoyed good health until the present illness. At onset the temperature reached 103°F.; it continued to rise to approximately this peak each day but was usually normal in the morning. The complaints were continuous, rather severe, diffuse, dull headaches, weakness and moderately severe night sweats. He had lost 6 pounds in the course of his disease.

The physical examination revealed a well-developed and well-nourished man, weighing 152 lb. He was perspiring moderately. The temperature was 99.6°F., the pulse 120, and the blood pressure 100/70. A thorough examination did not reveal any finding of note. The liver and spleen were not palpated.

The laboratory studies showed a hemoglobin of 80 per cent, a red-cell count of 4,670,000 and a white-cell count of 8800. The differential count was normal. The sedimentation index was 0.47 mm. per minute. The urine contained the slightest possible trace of albumin. X-ray films of the chest showed the lungs to be clear; a flat abdominal film showed enlargement of the liver and spleen shadows. Agglutination tests on the patient's serum were negative against typhoid and paratyphoid B bacilli. That for undulant fever was positive through a dilution of 1:10,000. A blood culture revealed organisms which were morphologically and culturally identical with *Brucella abortus* and which were agglutinated by blood serum from a patient who had had undulant fever.

For 2 weeks before the institution of sulfanilamide treatment there was daily elevation of the patient's temperature to around 102°F (Fig. 1). On July 26 treatment with the drug was started. The first day 90 gr. was administered, and for 9 subsequent days 60 gr. a day. This dose represents the average requirement for a patient of this weight; blood-serum determinations of sulfanilamide were not made. The drop in temperature following treatment with the sulfanilamide was dramatic, and after 10 days the temperature was normal. A negative blood culture was obtained at the termination of treatment.

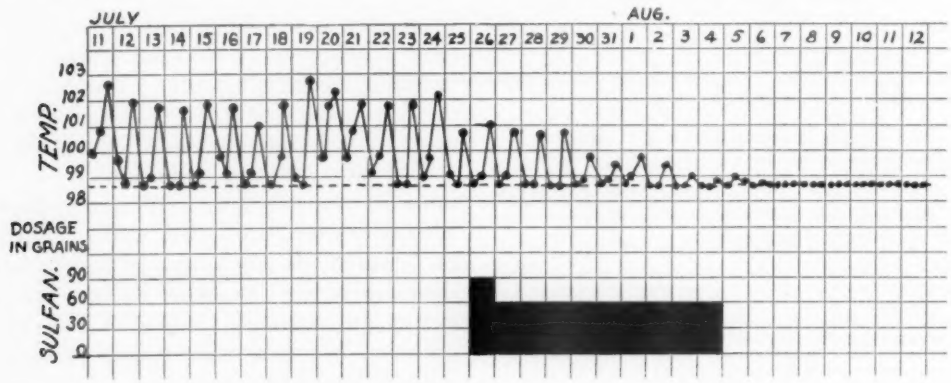

Figure 1. *The Use of Sulfanilamide in the Treatment of a Case of Undulant Fever.*

The diagnosis of undulant fever in this case was established by the clinical course, the positive agglutination test in a high dilution, and the positive blood culture. The source of the infection may be attributable to the fact that the patient had been drinking raw milk.

In the cases reviewed by Blumgart only 2 had positive blood cultures to substantiate the diagnosis; his own case had adequate blood-culture studies. Only 7 of the 14 cases in the literature showed disappearance of temperature within seven days of the onset of sulfanilamide therapy.

SUMMARY

A case of undulant fever is reported which shows an apparently specific response to sulfanilamide. The diagnosis was verified by a positive agglutination test and a positive blood culture. This result seems to give impetus to the use of sulfanilamide in this condition.

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THE SIMPLIFICATION OF LABORATORY DIAGNOSIS FOR THE GENERAL PRACTITIONER*

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SHORTLY after a young physician took over a backwoods practice, a patient consulted him complaining of severe pain in the flank, and brought with him a bottle containing grossly bloody urine. The doctor said that he could not make a diagnosis until he had made a microscopic examination of the urine in order to see whether it contained red blood cells. A glance would have given him the information he wanted. He was unable to see the woods for the trees.

Another doctor had a patient who complained of progressive loss in weight, increasing pallor, nausea and vomiting, demonstrating the latter complaint by vomiting into a basin. The physician asked the patient to return the following morning for a gastric analysis. He never returned. If the physician had only tested the spontaneous specimen for free hydrochloric acid, an extremely simple laboratory procedure, he might have been able to rule in or out the diagnosis of gastric malignancy which he suspected from the history. This teaches us that in the frequent cases in which gastric analysis seems indicated and the patient either cannot or will not have this done we should have him bring or send in any vomitus raised.

With these examples in mind, the thought occurs to me that considerable economy can be effected along these lines in the whole field of laboratory procedure. To the uninitiate, the average medical journal gives the impression that a very thoroughly scientific and highly technical brand of medicine is practiced throughout the country. This may be in large part true of those places whence the bulk of these articles emanate, — the larger metropolitan hospitals, particularly the teaching hospitals, — but it is far from the sort of practice carried on in outlying districts by the profession at large. Here expediency and economic considerations often compel the physician to employ a short-cut method of diagnosis. This approach, a rather neglected aspect of present-day medical teaching, does not imply a return to the old "guesswork" type of diagnosis.

The purpose of this discussion, then, is to show how a good part of modern laboratory procedure can be modified or simplified so that it can be easily carried out by the practicing physician who is equipped with a minimum of technical apparatus. In many cases the simpler methods to be outlined are intended to supplement rather than replace the more complicated tests. If the simpler procedure gives results consistent with a suspected diagnosis, the more complicated one may, if necessary, be carried out. In this way the latter need not be used so frequently. There will even be cases in which it can be eliminated. This should result in a considerable saving to the patient.

To begin with, consider what a wealth of information can be obtained from a routine urinalysis without resort to such a highly technical procedure as a blood-urea-clearance test. The determination of the specific gravity of the urine is an exceedingly simple test, but by it we can usually rule out any serious damage to the renal parenchyma. If a routine urine specimen or one obtained after fluid restriction shows a specific gravity of 1.020 or higher we can forget the possibility of renal disease. Such a finding permits the use of Salyrgan therapy in a patient with congestive heart failure.

The finding of very large quantities of albumin in the urine ("trace" or "large trace" by Heller's nitric acid ring test) may serve as a clue to the existence of the so-called nephrotic state. This condition calls for an investigation of the serum protein, the albumin-globulin ratio and the blood-cholesterol value. It is not of mere academic interest but is extremely important to recognize, for it predicates the administration of large quantities of protein, a dietary regimen diametrically opposed to the restricted protein intake ordinarily prescribed for the more usual forms of Bright's disease.

The glucose tolerance test is another tedious and expensive procedure requiring a series of venepunctures. A modified glucose tolerance test carried out in exactly the same manner as the usual test, except that a series of urine specimens is examined, can give almost as accurate information as to how sugar is handled by the body, and venepunctures and blood-sugar determinations are unnecessary. This urine test will admittedly miss the rare cases with a high renal threshold.

Until recently the method of typing the pneumococcus in cases of lobar pneumonia was the elaborate and time-consuming one of injecting the

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sputum washings into the peritoneal cavity of a mouse and examining the peritoneal exudate after sixteen hours or more. There is now available the much simpler Neufeld technic, which enables us to identify the type in a few minutes. A drop of the sputum is mixed on each of a series of coverglasses, each having a drop of anti-pneumococcus rabbit serum of various types. A drop of methylene blue is added and mixed in thoroughly with a wire loop. The slide is immediately examined under an oil-immersion lens, with the illumination cut down. If the pneumococci are surrounded by swollen capsules (*Quellungreaktion*), the pneumococci are of the same type as the antiserum. This procedure can be carried out in a laboratory if one is convenient, but if the physician practices in a remote region he can save considerable time by doing the test himself.

The diagnosis of diphtheria, like that of pneumonia, must be made early so that serum therapy may be started at the earliest possible moment. It has been our practice to begin serum therapy once serious suspicion of diphtheria has been aroused, without waiting a day or longer for the culture report. There are, however, some cases in which we may be suspicious of diphtheria but reluctant to give serum without a more positive diagnosis. In cases of this sort it is fortunately now possible to make a tentative bacteriological diagnosis in four hours by the method elaborated by Brahdy and his co-workers.* The Brahdy rapid-culture tube contains a sterile swab which is impregnated with culture medium. After the usual swabs have been taken for the State Board of Health, the Brahdy swabs are taken in the usual manner and returned to the tubes. A vest pocket serves as an incubator; after four hours the swabs are firmly rolled on microscopical slides, and the smears thus obtained are stained with Loeffler's methylene blue and examined microscopically for diphtheria bacilli.

In the evaluation of the size of the pelvis in a pregnant woman the measurement of the diagonal conjugate and the transverse diameter of the outlet can give practically as accurate information as the recently introduced methods of roentgen pelvimetry. Those cases which are borderline by manual measurements are apt to be borderline by the x-ray, and the old, reliable "test of labor" must be employed in either case. The x-ray has value, however, in determinations of fetal viability, or where cesarean section is contemplated and it is desired to rule out a monstrosity or fetal hydrops.

*Brahdy et al.: A rapid method for the identification of diphtheria bacilli: also a new method for identification of carriers of diphtheria bacilli. J. A. M. A. 104:1881-1883, 1935.

For years we have been depending on basal metabolic rate determinations to assist us in making the diagnosis of hyperthyroidism or hypothyroidism. Numerous formulas have been devised correlating such factors as the pulse rate and the blood pressure, determined under truly basal conditions, from which the basal metabolic rate may be computed with a fair degree of accuracy. When we have had more experience with this method, it is possible that actual metabolism determinations may, in part at least, be eliminated. At best, however, it seems that this will probably be used only in the mild cases in which the possibility of operation is not entertained. It is very unlikely that we can be satisfied with anything but an actual determination of the basal metabolic rate in the severely toxic patients for whom operation is contemplated. Perhaps with experience we may, by the use of these calculations, be able to select the patients on whom actual tests should be done. A basal metabolic rate determination may, for example, be carried out on patients whose computed rate is suspiciously high or low or is borderline, while it may be omitted where the estimated figure is approximately normal.

Let us consider also how well we can get along without the aid of the electrocardiogram, limiting discussion to the arrhythmias and conduction disturbances. In the past we have been prone in dealing with irregularities of the heart to content ourselves merely with the statement that "the heart is irregular," without attempting to determine the type of irregularity. This would be pardonable if different mechanisms had one and the same prognostic and therapeutic implications; but occasionally one type of irregularity is perfectly benign and demands no special treatment, while another type, at first glance similar, may have more serious connotations and call for immediate and specific measures. The precise determination of the nature of the irregularity may often be made without an electrocardiogram. To be sure, this demands our utmost power of concentration, but "he who runs may read." It is important to listen over the precordium and not try to make out the type of disorder by feeling the pulse at the wrist.

The premature beat or extrasystole may be detected by the fact that a quick beat is followed by a long pause so that the duration of the short plus the long pause is approximately equal to two regular beats and the dominant rhythm is not disturbed. By this I mean that if we keep time by tapping in rhythm with the heart beat, the rhythm is not disturbed by the quick beat and the compensatory pause.

With an auricular premature beat the extra beat sounds normal except that it comes a little early, whereas a ventricular premature beat is apt to give a clicking sound. Furthermore, the jugular vein in the case of the ventricular premature beat may show a sudden large wave. Premature beats as such may have absolutely no significance and may occur in perfectly normal hearts. On the other hand, their appearance in a patient undergoing digitalis therapy whose heart has been quite regular may be an indication of increased myocardial excitability and call for temporary discontinuance of the drug.

Auricular fibrillation is one of the most frequent arrhythmias. Ordinarily it is not difficult to recognize. The beats follow one another in haphazard fashion, short and long pauses being intermingled. If we try to detect an underlying dominant rhythm we fail. Auricular fibrillation has no rhythm, and the earlier term "delirium cordis" aptly describes the arrhythmia. It is usually unnecessary to take an electrocardiogram in order to detect this irregularity. But if the physician happens to see the patient for the first time when the rate of the ventricles has already been slowed with digitalis, the diagnosis may be difficult. Under such circumstances exercise may make the abnormal rhythm more obvious. The differentiation of frequent extrasystoles, particularly auricular, and auricular fibrillation may at times be difficult. With extrasystoles the pauses occur after quick or short beats and are compensatory, which is not true of auricular fibrillation.

The various grades of heart block can also in large part be recognized without the electrocardiograph. The slightest degree of auriculoventricular heart block is simple prolongation of auriculoventricular conduction time, each auricular beat being followed by a ventricular one. This condition cannot be diagnosed clinically, but its presence may be suspected if there is a gallop rhythm. In the presence of a severe acute infection, such as diphtheria or rheumatic fever, gallop rhythm should lead one to suspect heart block. Gallop rhythm itself, however, may be due to other causes, and its presence is by no means diagnostic of prolonged auriculoventricular conduction.

In the next higher grade of auriculoventricular block every successive beat is not heard. The omissions need not recur regularly. The next succeeding beat is heard just when it would be heard if the preceding beat were not omitted. This condition is accurately described by the term "dropped beats," but that phrase should never be used to describe the rhythm in auricular fibrillation.

In the next higher degree of block the ventricles may respond regularly to every second (2:1 block) or third (3:1 block) auricular beat. If the ventricles are beating regularly at a rate of from 80 to 100 we may not even suspect the presence of this rhythm. At times an abrupt, spontaneous doubling or halving of the rate may furnish a clue. Or the rate may deliberately be altered by massage of the right or left carotid sinus. The carotid sinus is a palpable bulbous enlargement in the neighborhood of the bifurcation of the common carotid artery, which is the site of origin of numerous reflex mechanisms that have been recently described. This region should be massaged with firm pressure of the fingers in a rotary manner.

If the auriculoventricular block is complete, the auricles and ventricles beat absolutely independently of one another. Thus, while the auricles are beating at a rate of 90, the ventricles may assume their inherent spontaneous rate of 35 or less. In fact we should always suspect the presence of complete heart block if the apical rate is 35 or less. Most if not all rates as slow as this are due to complete block. If the block is of congenital origin or is due to medication with digitalis the apical rate is apt to be higher — 40 to 80 beats.

Complete block is easily recognized by bedside methods. First, carotid sinus pressure or deep breathing or exercise has little if any effect on the rate or rhythm of the heart. Secondly, inspection of the jugular vein may disclose the auricular pulsations in the interim between the slow ventricular contractions. Thirdly, it may be possible to hear the muffled distant auricular sounds between the louder ventricular contractions. These occupy varying time relations to the preceding and following ventricular sounds. Ordinarily the auricular contractions can be heard best at the base of the heart or in the second, third or fourth intercostal space to the left of the sternum. Fourthly, careful auscultation over the precordium may reveal occasional changes in the quality of the first heart sound. This alteration in pitch is due to the chance coincidence or juxtaposition of auricular and ventricular contractions. Its existence enables us to diagnose complete heart block without an electrocardiogram.

It is impossible to make a definite diagnosis of bundle-branch block on clinical findings alone. But since pulsus alternans, gallop rhythm and bundle-branch block are so frequently associated with one another, the finding of the first two should serve as a clue to the presence of the third. A reduplicated apex impulse is highly suggestive. This can be graphically demonstrated by a simple bedside test which enables us to amplify the

apex impulse mechanically. It consists in taping one end of a broom straw over the apex impulse with adhesive tape and projecting the shadow of the free end of the straw onto a piece of cardboard with a flashlight. In the presence of bundle-branch block the impulse will be reduplicated or have a double hump. This sign is not reliable in the presence of hypertension. A positive diagnosis of bundle-branch block can be made only with the electrocardiograph.

Lest my remarks be construed as arguments against modern laboratory diagnosis, let us remind ourselves that there are certain laboratory tests without which a positive diagnosis cannot be made. For example, the Wassermann test or one of its modifications is indispensable for the diagnosis of syphilis. Because this is the only way of detecting the latent asymptomatic case, because there are so many such cases and because the test is carried out by the State at no cost to the physician or patient, this test should become routine in general practice. Routine tests on blood samples from pregnant women have brought to light innumerable cases of syphilis and have cut down remarkably the luetic morbidity of the fetus. It is only another step in the same direction to apply the same test to our patients at large — a task difficult but not impossible of achievement.

Another indispensable procedure is an x-ray film of the chest in all suspected cases of pulmonary tuberculosis. True it is that the demonstration of tubercle bacilli in the sputum is the only conclusive method of diagnosing tuberculosis, but if tubercle bacilli are not found, the disease cannot be ruled out without a negative chest film. Even if the bacilli are demonstrated, a chest film is usually made so as to determine the extent of pulmonary involvement.

SUMMARY

A saving of time, money and effort in the entire realm of laboratory procedure is desirable. The Neufeld method of typing pneumococci, Brahdy's rapid method for culturing the diphtheria bacillus, the manual determination of the internal conjugate and transverse diameters of the pelvis and the elucidation of certain cardiac arrhythmias and conduction disturbances by clinical bedside measures, without the aid of electrocardiograms, are examples of the sort of economy that can be practiced.

PROGRESS IN UROLOGY

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WITHIN recent years progress has been made in the irradiation treatment of malignant growths of the genitourinary organs. The brilliant work of the members of the staff of the Memorial Hospital, New York City, in demonstrating the beneficial effects of radium and roentgen irradiation in tumors of the testicle is an evidence of this progress. These highly malignant neoplasms are now much more effectively controlled than formerly, since irradiation has taken an important place in their routine management. In many quarters, however, the feeling persists that irradiation is the court of last resort to which are sent only the most hopelessly advanced cases of malignant disease, although it is evident that in fields other than that of urology this opinion is less prevalent. If the recent literature dealing with this subject is reviewed, the impression is gained that roentgen irradiation is now more frequently used in the treatment of certain forms of genitourinary malignancy, and that the reports from its use are becoming more encouraging. This increased interest in roentgen irradiation is due to the development of more powerful x-ray units, together with a better understanding of the effects of irradiation on living cells.

Machines which operate at constant potentials of 400 to 1000 kilovolts are replacing those of lower voltages, and although supervoltage treatment of malignant disease is still in a stage of experiment, there is evidence that such high voltages deliver a dose of greater depth with less general reaction and skin change. Million-volt x-ray units for the treatment of cancer have been in successful operation at the California Institute of Technology and at the Huntington Memorial Hospital, Boston. The ultimate effects of such high voltages on malignant tumors or normal tissues are little known, but since they show promise of some effectiveness in destroying cancer, a review of past experience in x-ray therapy is worth while.

In treating malignant tumors of the kidney x-ray

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irradiation is most valuable before operation. Renal neoplasms show great variability in sensitiveness to irradiation, from the rapidly growing embryonal or Wilms tumors of childhood, which are extremely radio-sensitive, to the non-sensitive adult tumors of the renal pelvis. Adult tumors of the kidney parenchyma take an intermediate place in this respect, and vary in their sensitiveness to irradiation. The greatest interest lies in this group of adult tumors, since they greatly outnumber the rest, and the effects of irradiation on them are less well known. Interest in this regard was stimulated in 1935 by Waters's[1] enthusiastic description of the effects of preoperative irradiation on 3 cases of cortical renal tumor. They received comparatively small doses of x-ray with a 200-kilovolt machine. Two tumors were presumably of the hypernephroma type; the other was embryonal, in a child of four. As a result of the effect of x-ray treatment, Waters reached the following conclusions:

> Tumors of hypernephroma type and embryonal carcinomas are radio-sensitive.
>
> Papillary carcinomas of the renal pelvis and the malignant papillary cyst adenomas are radio-resistant.
>
> Irradiation has caused a striking reduction in the size of radio-sensitive renal tumors, and has rendered tumors which were inoperable, on account of their large size, operable.
>
> Irradiation has produced extensive morphologic changes in sensitive tumors characterized by alterations in the cellular structure, extensive fibrosis, hyalinization and necrosis. The cells become shrunken. The cytoplasm may contract around the nucleus, and in certain cases the tumor has been completely destroyed and replaced by fibrous tissue.
>
> Normal renal tissue has not been injured by irradiation in the dosages employed in our cases.
>
> Palpation of the tumor at all times should be avoided as much as possible, to prevent expressing tumor cells into the blood stream.
>
> Reduction begins almost immediately after the institution of irradiation and continues for a period of several weeks after the cessation of the treatments.
>
> Operative removal is imperative and should be carried out after either the first or second series, depending upon the degree of shrinkage of the tumor as revealed by palpation and retrograde pyelographic studies.
>
> A regrowth of the tumor may and has occurred if operation is delayed too long.
>
> Preoperative irradiation has not made operation more difficult.
>
> Finally, the study has shown that in order to lessen the mortality rate in renal tumors earlier diagnoses must be made. Greater significance must be attached to hematuria and pain. The retrograde pyelogram will differentiate the pelvic and cortical tumors in from 80 to 100 per cent of these cases and, in our experience, 93 per cent of all cortical renal tumors have been radio-sensitive.

Encouraging and enthusiastic as this report was, one questioned whether these few cases, not heavily radiated, adequately supported the conclusions reached.

Further encouraging results from preoperative irradiation of renal tumors were reported by Wharton[2] in the same year. He pointed out the discouraging results of surgery alone in controlling these growths, since 5 to 10 per cent of all such patients were considered inoperable because of metastases or extent of the local growth, 12 to 26 per cent had only exploratory operations, 15 to 50 per cent died of operation or shock, and of the remainder less than 10 per cent were permanently cured. His experience with preoperative irradiation was striking. In 4 cases in which it was used, enormous tumors are said to have shrunk considerably, usually within three weeks. Two of these were hypernephromas, and 2 embryonal tumors in children. Preoperative radiation is said to have greatly lessened the magnitude of operation through decreasing the size of the tumor and possibly lessening the chance of recurrence, since trauma was less and the renal pedicle was more easily located and ligated. Although impressed by the extensiveness of cell destruction following irradiation, Wharton believed it could not be expected to eliminate the malignancy, and that nephrectomy was therefore essential. The transperitoneal approach was urged as the most logical, cleanest and surest way of removing tumors of the kidney.

The generally prevailing opinion that surgery alone inadequately dealt with the problem of renal malignancy was brought out by Prather's[3] summary, which showed that between 35 and 60 per cent of all patients with renal tumor had no chance of living for any extended time. Surgery was ineffective largely because the size of the tumor prohibited or discouraged operation or prevented adequate removal. Three cases of cortical renal tumor in which preoperative radiation reduced the size of the tumor and made nephrectomy easier are included in this report. One of these patients, aged three and a half, with a Wilms tumor, received 4000 r of preoperative and postoperative radiation with the 200-kilovolt machine, and lived for nearly two years after operation. Two patients with hypernephroma received 6000 and 9000 r of similar irradiation, respectively, before transperitoneal nephrectomy. In all these cases there was considerable tumor regression from the irradiation. One case of adrenal tumor was apparently not influenced by preoperative irradiation. It was considered that the immediate effect of reducing the size of the tumor and permitting easier nephrectomy might improve the five-year results.

In a more recent contribution on this subject, Munger[4] asserts that irradiation has become an

almost universally accepted procedure as a part of the treatment of malignant renal neoplasms, and cites 3 cases of adenocarcinoma which received, respectively, 8400, 8400 and 6300 r of high-voltage irradiation preoperatively with a 650-kilovolt machine. Irradiation with these doses appeared to have a temporary, irritating effect on the remaining normal kidney, and a very marked latent, depressant effect on the one already damaged by nephritis. Effects of high-voltage treatment with large total dosage are said to have been no more embarrassing to normal kidney tissue than were those of lower voltages.

One important phase of this problem is the accuracy with which a preoperative diagnosis of malignant renal tumor can be made. In one case a large renal mass subjected to heavy preoperative radiation proved at operation to be a simple solitary cyst, and the postoperative convalescence was considerably prolonged because of poor healing. A patient with a huge, benign renal adenoma which was partly necrotic might easily have been given preoperative x-radiation, with disastrous effects. Such errors in diagnosis are not likely to appear in the literature. The performance of aspiration biopsies on all suspected renal tumors, as mentioned by Dean,[5] is not a commonly accepted procedure and may not be devoid of harm.

Dean[5] has ably commented on preoperative radiation as follows:

> Preoperative irradiation of renal tumors has been recommended (1) to devitalize tumor cells and thereby lessen the likelihood of disseminating metastases by operative manipulations. Little proof exists that metastasis is promoted by careful surgery. Furthermore, if it were a common occurrence it is doubtful whether preoperative irradiation could completely eliminate the danger. Even in those tumors in which the most marked radiation regression has been obtained one can usually find a certain amount of apparently viable tumor tissue. However, until there is more exact knowledge on this point it is more conservative to reduce the possibility of metastasis in any practical way.
>
> Preoperative irradiation of renal tumors has been recommended (2) to diminish the size of the tumor and make nephrectomy easier. This is a radiation effect of much clinical importance. A large proportion of the tumors of the renal parenchyma in adults and the great majority of Wilms' tumors in children shrink when irradiated. Only a therapeutic test will determine how much an individual tumor will respond, but the benefit may be so marked that the preoperative irradiation of all large renal tumors is recommended.
>
> Preoperative irradiation of renal tumors has also been recommended (3) to make inoperable tumors operable. In this discussion an uncomplicated primary tumor will not be classified as inoperable because of its large size alone. A tumor will be considered inoperable if it has invaded the perirenal tissues or if metastasis has occurred. As yet in these cases irradiation has been unsuccessful in so reducing the growth that nephrectomy will effect a cure.
>
> It is important to know the amount of radiation which can be delivered to the average renal tumor. Employing the 200-kilovolt roentgen ray unit with anterior, posterior and lateral portals, each as large as the size of the patient's body permits, using a target skin distance of 70 cm., and giving the treatment in divided doses of 300 r to one portal daily, filtered through 0.5 mm. of copper, it is possible to give most patients 2400 r to each portal in about twenty-six days. Knowing the depth doses of roentgen irradiation and after making measurements of patients, of cross sections of cadavers, and of localizing roentgenograms, it has been computed that this amount of treatment will deliver approximately five threshold erythema doses of radiation within the average renal tumor. This is sufficient radiation to profoundly alter radio-sensitive neoplasms. We do not know that it can completely destroy a renal tumor, but metastases from radio-sensitive teratomas in about the same location have been controlled for more than ten years with a fraction of this dose. Intensive irradiation such as this causes marked changes in the skin and superficial tissues, so that further treatment might prove dangerous even after an interval of several months.
>
> In treating infants 200 r per day at 50 cm. distance has been effective. No attempt should be made to give a predetermined total dose to these small patients. Careful examinations should be given before each treatment. Irradiation effects can best be gauged by the clinical changes noted from day to day.
>
> The value of a preoperative cycle of irradiation which may deliver a maximal dose of five threshold erythemas to a tumor depends largely upon the cellular make-up of the growth. Epithelial tumors of the renal pelvis are radio-resistant. For this reason and because they tend to remain localized for a long time and because there is usually associated obstruction and infection, preoperative irradiation is not recommended. . . .
>
> With our present inadequate knowledge and until more powerful sources of radiation are provided, it is probably safer to regard preoperative irradiation strictly as an adjunct to surgery. The urologist should closely observe his patient and keep in mind his general condition as well as the local disease. Measurements of the tumor should be made at least twice a week. Excretory pyelograms are also helpful in determining the effects of irradiation. While destruction of a tumor by irradiation is usually manifest by diminution in its size, such is not always the case. However, until more accurate criteria are practicable, frequent measurements are the best guide.
>
> If the growth is radio-sensitive, regression will be prompt and rapid. Perhaps the tumor will disappear after only a part of the maximal dose of radiation has been given. Since this is as much regression as can reasonably be expected, nephrectomy can be performed without further delay. In tumors which are more radioresistant it may be necessary to give a full dose of radiation and wait a few weeks before the greatest possible regression takes place. However, little is to be gained by a delay of more than a month.
>
> We have found that healing of nephrectomy wounds may be delayed by heavy irradiation, but so far this disadvantage has been of relatively little practical importance.

The large Wilms tumors of children proved to be quite as radio-sensitive as the metastatic teratomas in Barringer's[6] experience at the Memorial Hospital in New York City. Such tumors showed the same remarkable primary regression. This was temporary, however, and the reaction to further radiation was not so favorable. Radiation alone failing to cure the condition, nephrectomy following the primary regression was suggested. The record up to that time, however, of patients from whom kidney tumors had been removed after irradiation was not considered brilliant, nor was it thought that their lives had been much lengthened.

The foregoing reports make it clear that irradiation is assuming an important place in the management of malignant renal neoplasms and that it is favorably considered as a preoperative measure to reduce the mass, so that its surgical removal can be more easily and effectively accomplished. Since most of these reports have to do with treatment by machines of low voltage, accounts of the results of high-voltage therapy will be of great interest.

Cancer of the prostate remains a difficult problem. Where the growth is discovered early and is confined within the fibrous capsule of the gland, the radical operation devised by Young offers some chance of cure. But the problem is by no means solved in this manner, since a very small percentage of patients present themselves with the tumor so limited that this operation is practical. Most individuals with this disease, therefore, must be treated in some other way. For many years partial removal of the malignant tissue was accomplished by suprapubic or preferably perineal operation, the obstruction being thus eliminated. Transurethral resection now effectively removes obstructing tumor tissue by a less serious operation. Since none of these methods offer more than temporary relief, external and internal irradiation have been employed in the hope of checking tumor growth. Few were the cures effected. External irradiation with a 200-kilovolt machine usually gave relief from the pain of metastatic bone involvement and nerve infiltration, but its effects on the primary growth were disappointing. Implantation of radium in these tumors through the open suprapubic wound or through the perineum gradually lost many of its advocates, because the cancer was not adequately controlled, and increased suffering from sloughing, infected tissue and subsequent fibrosis frequently resulted. Reports of the results of supervoltage irradiation in prostatic cancer, or the combination of external and internal irradiation, are beginning to appear in the literature and during the next few years will be read with interest.

Two years ago Barringer[7] advised external and internal irradiation as a means of controlling prostatic malignancy. The following is quoted from his paper:

> Progress in the operative control of prostatic carcinoma has been slow. A study of the cross-section of the prostate reveals how small the field of operation is. Operative removal presupposes much trauma to the cancerous tissue. Trauma, following Ewing's dictum, is the greatest factor in dissemination of the cancer. One of the earliest changes in prostatic carcinoma is "perineal invasion of the prostatic capsule" (Moore). Invasion of the vesicles and distant lymphatic invasion, however, are late manifestations. This fact might be construed as favoring either operative removal or irradiation treatment. Young, who originated radical resection, reports the cases of a few patients operated upon and very few five-year cures. No other urologist shows even comparable results.
>
> Irradiation offers the only hope to control these difficult cases, and irradiation means the combination of deep x-ray therapy and intraprostatic irradiation. We have sufficient proof that neither of these alone is enough to control the disease. Deep x-ray therapy and intraprostatic irradiation should be administered simultaneously as far as possible. Our present conception of the proper way to apply deep x-ray therapy (200 kilovolts) is that it should be given through five portals of entry, 300 r being given daily at a distance of 70 cm. until 1550 to 1900 r or even more are given to each portal. The usual portal is 10 by 12 cm. External irradiation as a rule is not repeated. Intraprostatic irradiation is carried out by means of radium. If the posterior lobe alone is involved, removable radium needles, gold-screened, are inserted into the prostate through the perineum; 1500 to 1800 millicurie hours are given intraprostatically every two months until the carcinoma of the prostate and of the periprostatic region is controlled. If the lateral and median lobes are involved, suprapubic implantation of radon seeds is the treatment of election. The seeds, having a dosage of 1.5 millicuries, are implanted throughout each cubic centimeter of prostatic tissue. One may not be able to implant the posterior lobe from this approach, in which case perineal needles are inserted as just described.
>
> The treatment of retention is by means of transurethral or suprapubic partial prostatectomy with the high-frequency loop. This operation is followed by irradiation in accordance with the technique outlined. Modifications of the operation and the irradiation dosage must of necessity depend upon the conditions found in the patient treated.

A series of cases in which Barringer used adequate external and intraprostatic irradiation is not ready for reporting at this time. Of 357 cases, 20 per cent were too extensive for treatment, 8.3 per cent had been controlled for three years by radium implantation alone and 5.7 per cent for over five years.

The advantages of radium treatment over radical operation in prostatic cancer were stressed by Fruchaud[8] of France, but his advocacy of the radical suprapubic operation of Marion as a method of treating early malignant disease will probably have few supporters. Nevertheless, he considered

radium treatment well suited to the treatment of cancer of the prostate, but pointed out that radium could be depended on to destroy cancer only in a very limited area, and that it was useless to hope for the destruction of tumor tissue outside the prostate itself. Therefore one can treat with some chance of success only those cases of cancer of the prostate which are early, and when radium needles can be placed outside the zone of infiltration. When the neoplastic infiltration has advanced beyond the bounds of the prostate, the radium needles are within the infiltrated area and irradiation is of no use. Although the end results of radium application are evidently not perfect, Fruchaud observed a shrinking of the malignant gland and the disappearance of nodules and induration. He frankly admits that the eventual prognosis is darkened by the frequent appearance of diseased pelvic lymph nodes or distant visceral and bone metastases; in well-chosen cases, however, the use of radium incurs less risk and gives the least bad results with perhaps some cures. He considers radium therapy to be ineffective when the cancer has invaded the cellular pelvic tissues, and x-radiation is dismissed because of the deep-seated situation of these growths.

The efficacy of external radiation in the control of prostatic malignant disease has been disappointing. Barringer[9] considers cancer of the prostate to be radio-resistant, and rarely sees a case where superficial external irradiation is sufficient to control the growth. Little, however, has yet appeared in the literature concerning the treatment of these tumors with more powerful x-ray units. Burnham[10] summarizes his three and a half years' experience in treating prostatic cancer with the 600- to 900-kilovolt machine at the California Institute of Technology. A third of these cases had bone metastases, and the full treatment could not be given. In the remaining 22 cases there was tremendous shrinkage of the mass, and in a number complete disappearance. Cystitis and proctitis were common, and some skin injuries. The effect on the tumors was said to have been impressive. Another review[11] of the results of supervoltage therapy from the same institution was encouraging in that 4 of 9 patients treated from June, 1933, to June, 1934, were in such good general condition that the chances of a permanent arrest of growth of the tumor seemed excellent. Three of 8 such patients treated from June, 1934, to June, 1935, were in similarly favorable circumstances. Seven of 10 patients treated from June, 1935, to June, 1936, showed the original mass as being well under control and were in good condition. Prostatic cancer has been so resistant to the effects of low-voltage x-rays that it seems doubtful that higher voltages would accomplish much in their cure; further reports of their use in this dread disease will be eagerly read.

Tumors of the bladder cannot well be standardized in their treatment, since they differ so markedly in their situations and characteristics of growth. It is generally agreed that radical surgical excision when possible is the best method of treatment. Less radical measures, as recently advocated by Bumpus,[12] have little appeal to anyone experienced in dealing with malignant disease. The beneficial effects of external radiation have not yet been sufficiently demonstrated to make this an approved method of treatment of these neoplasms. Enough favorable results, however, have found their way into the literature to raise the question whether the latest forms of external irradiation may not have something in their favor. Among others, Bothe[13] writes favorably about a small series of such growths so treated. Two patients with benign papillomas showed unexpected changes in the tumor after external irradiation, the growths shrinking to about half the original size. The malignant papillomas showed a wide variation in the effect of irradiation, and in 5 cases subsequent cystoscopy and pneumocystography gave no evidence of remaining tumor. One of these patients was under observation for two years and showed no evidence of recurrence. Six patients with papillary carcinoma gave cystoscopic evidence of over 75 per cent tumor regression after irradiation, although an elevated, thickened pedicle persisted. Tumor regression in others was estimated at 25 per cent. Irradiation improved 4 patients with the infiltrating form of the disease, and 2 subsequently gave no definite evidence of tumor by cystoscopic examination. Bothe considered the results from x-ray irradiation alone encouraging. The tumor regression in some instances greatly facilitated interstitial irradiation.

A reasonable opinion of the value of roentgen irradiation in cancer of the bladder is taken from Graves and Dresser.[14] They conclude that external irradiation with 200-kilovolt equipment, by ordinary methods and with ordinary dosage, has no place as a curative agent in the routine treatment of malignant tumors of the urinary bladder. As a palliative agent it is considered useful, especially in the arrest of hemorrhage, and in an occasional case sufficient regression may be accomplished to render an extensive lesion more amenable to cure by other means. With greater doses than they have employed a higher incidence of complete regression is probable. They write, in part:

Super-voltage [treatment], not yet sufficiently perfected for general use and not available except in a few clinics, has yet to be explored in so far as it applies to this field. With the advent of roentgen-ray machines operating at very high voltage and with heavy filtration, a larger depth dose may be delivered than is possible with 200,000 volts, and with much less damage to the superficial tissues. If one employs 1,000,000 volts, constant potential, for example, about 50 per cent of the skin dose is delivered to the region of the bladder, and the skin will tolerate double the number of r units. With external irradiation of some such type as this it may prove possible to arrest the growth of a fair percentage of bladder tumors satisfactorily without serious damage to the surrounding normal structures.

Finally, it is our belief that tumors which are amenable to cure by surgery, or by surgery combined with interstitial irradiation, are still best treated by these means. Apart from its important role as a palliative agent in the inoperable cases, the greatest promise for the usefulness of deep therapy would seem, at present, to lie in the treatment of radio-sensitive types of multiple papillomatosis of the bladder, and in the treatment of those cases, also radio-sensitive, in which the tumor has involved both ureters or the region of the vesical neck. As a general rule, it will probably prove wise, having learned all the pertinent facts about the patient, including the histology of his tumor, to delegate the case, definitely, in the beginning, to the genitourinary surgeon or to the roentgenologist and not to attempt to combine, in the first treatment of the disease, their separate and distinct methods of approach.

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CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTEMORTEM AND POSTMORTEM RECORDS AS USED IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT, M.D.

TRACY B. MALLORY, M.D., *Editor*

CASE 24511

PRESENTATION OF CASE

A forty-two-year-old, married night-watchman was admitted complaining of loss of weight, cramps in the legs and asthenia.

Two and a half months prior to admission the patient was of normal weight (160 pounds) and had no complaints. Two weeks later he noted that he was beginning to lose weight. He was stopped on the street by a district nurse two and a half weeks before entry and told that he looked poorly and should see a doctor. A few days later polydipsia was noted. Six days before entry his physician found sugar in his urine. There had been no jaundice, abnormal stools, fever or pain in the abdomen or thorax. He was not a chronic alcoholic. One brother had diabetes. His father died at forty-four of "kidney trouble from too much liquor." The patient's various occupations included painting, paper hanging and electrical work.

Physical examination showed a well-developed, poorly nourished man, who appeared old for his age. The skin showed evidence of dehydration and was normal in color except for slight pigmentation over the shins. The eyes showed compound myopic astigmatism. Several teeth were missing, and there was moderate pyorrhea. The tongue was dry and coated. The chest was somewhat barrel-shaped. His heart was slightly enlarged to the left. Systolic murmurs were heard at the apex and base. The blood pressure was 160 systolic, 95 diastolic. There was a prominent swelling in the right hypochondrium and midepigastrium, which descended with inspiration. A firm mass could be palpated with a definite edge on its left border which extended over toward the right costal margin. The mass was non-tender and did not feel nodular. There was dullness to percussion below the right costal margin, but the mass was not palpated there. The spleen was not felt. Both inguinal rings were enlarged. The prostate was large, the left lobe larger than the right, but it was not hard.

The temperature was 98.6°F., the pulse 78, and the respirations 23.

Examination of the urine showed a "brown" sugar test and positive diacetic and acetone tests. The blood showed a red-cell count of 4,600,000, 80 per cent hemoglobin, and a white-cell count of 6200, with 54 per cent polymorphonuclears, 2 per cent young neutrophils, 8 per cent mononuclears and 36 per cent lymphocytes. The fasting blood sugar was 278 mg. per cent, the nonprotein nitrogen of the serum 25 mg. The van den Bergh was normal, indirect. A liver function test showed 0 to 5 per cent retention of the dye. A blood Hinton test was negative. A skin test with echinococcus antigen was negative.

X-ray films of the abdomen showed an indefinite area of calcification over the right kidney pelvis. The shadow of the liver was well visualized, and the lower edge appeared to be 2 cm. above the ilium. No enlargement of the spleen could be made out. A barium enema was negative, except that the transverse colon and hepatic flexure were displaced downward. A gastrointestinal series was negative. The mass in the epigastrium was not connected with the stomach.

On the second hospital day it was noted that only 60 units of insulin had been required to reduce the urine to a sugar-free state. He was given 20 to 40 units of insulin daily and discharged on the fourteenth day with orders to take 140 gm. of carbohydrate, 70 of protein, 120 of fat and 40 units of insulin daily.

For the next three years the patient was followed in the Out Patient Department and did well. He was very intelligent and co-operative and kept a diary of all his reactions. Occasionally the insulin caused mild diarrhea, but no unusual episodes were noted. His diet had been changed to C-140, P-105 and F-108, and he was taking 80 units of protamine insulin daily. His weight had remained at about 130 pounds. His strength was good, and he felt well. About three years after discharge his urine was constantly showing a "yellow" or "red" test, and his insulin dosage was increased to 90 units. He gained 8 pounds in weight during the next three months and felt "fine." Four years after discharge his weight had again dropped to 132 pounds. His diet contained C-188, P-109 and F-190, and he was taking 80 units of protamine insulin daily. At that time his blood sugar was 312 mg. per cent. He felt quite well. On repeated visits to the Out Patient Department it was observed that the abdominal mass stretched completely across the upper abdomen; it extended 9 to 10 cm. below the costal margin in the nipple line and 12 to 15 cm. below the xiphoid in the midline. It appeared to enlarge slightly in the course of three years. It remained smooth and was never

tender. Throughout this period no pigmentation of the skin or sclerae developed. He was wearing a truss for a left, reducible scrotal hernia. Three months later he complained that the hernia had become very annoying. Surgery was advised, but the patient did not return after leaving the Out Patient Department. His blood sugar at that time was 364 mg. per cent.

Three weeks later he was brought to an outside hospital. He was very drowsy, restless and dyspneic, and complained of severe pain around his rectum. It was learned that he had not taken insulin during the previous two days. Physical examination revealed a pulse rate of 150, respirations of 48 and a blood pressure of 60 systolic, 40 diastolic. The anus and surrounding area were red, edematous and very tender. The left inguinal ring was dilated; but no hernia was present, and no definite tenderness could be elicited over the abdomen. His blood-sugar content was 334 mg. per cent. He was treated for diabetic coma, and five hours later showed a blood pressure of 155 systolic, 74 diastolic, which, however, was only momentary. Two hours later it was 100 systolic, 58 diastolic, and four hours later 76 systolic, 20 diastolic, where it remained for eight hours. The blood-sugar content was then 185 mg. per cent, and the urine gave a "green" test with Benedict's solution. A nurse who saw him at the end of this eight-hour period stepped out of the room for a few moments and, on returning, found him dead.

Differential Diagnosis

Dr. Alfred Kranes: We have in summary the story of a forty-two-year-old man with symptoms of diabetes for a little over two months before his admission to this hospital. On entry he was found to have moderately severe diabetes, and a large mass was discovered in the upper part of his abdomen, which had not been noticed by the patient and had apparently been asymptomatic. This mass persisted throughout the remainder of his life, perhaps becoming somewhat larger but remaining essentially unchanged and asymptomatic all during the period. He was treated in the Out Patient Department for four years where an effort was made to control the diabetes, but apparently it had grown more severe during the course of that time, since he required more insulin and even under a good regime continued to run a high blood sugar and have glycosuria. He finally entered another hospital and died in what may have been diabetic coma although the data are very meager on that point.

Apparently the chief point of interest in this case is the nature and character of the abdominal mass. In trying to explain the diabetes and the mass by one diagnosis, a pancreatic lesion naturally comes to mind. The thought that perhaps this mass was a large pancreatic tumor or cyst first occurred to me, but the description as given here certainly does not coincide very well with that of a pancreatic tumor or cyst. In the first place the mass is a little too high for the pancreas. Secondly, it does not appear round or cystic; and, finally, it descends with respiration, which you would not expect a pancreatic mass to do. In addition the x-ray findings, as described, do not seem to be consistent with a pancreatic mass.

Dr. George W. Holmes: I have put these films up so that you are looking at them from behind. This is the right side. Apparently there was depression in the duodenal bulb, seen during the fluoroscopic observation; I presume it was transitory. The films show that the duodenal loop is normal. While that does not rule out a tumor of the pancreas it makes such a diagnosis much less likely. There is nothing unusual in the appearance of the stomach. Then we have this indefinite shadow. In reading the note I had the impression that the calcified area was quite extensive; but as you see it is very faint and does not look to be of large size. It could be a gallstone or a calcified lymph node. There is a rather large shadow here in the region of the liver. It appears to displace the hepatic flexure downward, as described. There is nothing in the colon to lead one to think he had any disease there. The mass itself is not characteristic; it might be enlarged liver from any cause or some other mass in the region overlying the liver.

Dr. Kranes: We can, I think, exclude a pancreatic mass, even though the patient did have diabetes. From the x-ray appearance, the clinical description of the mass and the fact that it descended, there can be little doubt that it was a very large liver. A lesion of the gastrointestinal tract seems to have been quite well excluded. I do not see what else it could be but a large liver. If it is a large liver then what is going on there is difficult to recognize. A liver of that size makes me wonder about the possibility of primary or metastatic tumor of some sort, but the fact that the patient lived four years after the condition was discovered — and apparently it had been present for some time before it was observed here — practically excludes a neoplasm, certainly a carcinoma or any other malignant tumor. Syphilis is always a possibility, but there is no evidence of it. He had a negative Hinton test. Another possibility is amyloidosis, the usual reasons for which are absent. Of course we see amyloid deposits in the liver and spleen for which there is no evident explanation; but if he had amyloid disease

there is no way that I know of making a diagnosis unless a Congo red test or biopsy was done, neither of which is recorded. I think we shall have to forget about that.

Could this have been a large cyst in the liver? I suppose it could. A skin test with echinococcus antigen was done and found to be negative. It frequently is even when the disease is present. But here again the description does not sound like a cystic mass. It seems more like a diffuse enlargement of the entire liver. I should be inclined to pass over echinococcal disease very rapidly. He was a native; whether he had been out of the country, I do not know. Occasionally in diabetic patients one finds marked fatty deposits in the liver; cases have been described where the liver has grown progressively larger from such deposits. That is a distinct possibility in this case. Several such cases have been described from the Mayo Clinic, and the diabetes improved as the fatty metamorphosis of the liver progressed. One would expect, however, more of a change in the mass over a four-year period, if that were the case.

Another possibility which comes to my mind to explain a diffusely enlarged liver is some form of cirrhosis, and by and large I think that that is the most probable diagnosis in this case. There is no direct evidence to substantiate it, and no proof of cirrhosis in this patient, no evidence of hepatic insufficiency. His liver-function test was normal. There is no evidence of jaundice, but there is one statement which may be significant: "On the second hospital day it was noted that only 60 units of insulin had been required to reduce the urine to a sugar-free state." That may not be remarkable: it all depends on how severe the diabetes was on admission. If he was severely acidotic it might mean something. If he was not, and the blood sugar was only 278 mg. per cent, it would not be at all remarkable. But, if he were more acidotic than is apparent here, it might be a point favoring the diagnosis of diffuse liver disease. People with cirrhosis of the liver are sensitive to insulin — as a matter of fact it is sometimes used as a test of hepatic function. In such cases, small doses of insulin are injected and it is rather common for the patients to develop hypoglycemia and insulin shock. That is the only bit of evidence bearing on this point.

If he did have cirrhosis, — and I think he probably did, — its exact nature is difficult to predict. He gave no history of alcohol. Furthermore, if this were alcoholic cirrhosis one would expect that in four years the liver would have grown smaller and atrophic, whereas it remained large and possibly grew a little in size. So I do not believe he had alcoholic cirrhosis. So far as toxic or infectious cirrhosis goes there is no history of jaundice or of chills and fever that might lead one to suspect this type, and although it may be present without much of a history, I should again expect the liver, as time went on, to grow smaller instead of larger. The same is not true of biliary cirrhosis. There one may have, and persistently so, a very large liver; but this is not the history of a biliary cirrhosis. The patient was never jaundiced, and I should think that that would be a sine qua non to a diagnosis of biliary cirrhosis: there should have been jaundice at some time.

There is one form of cirrhosis that will account for this kind of liver, — but I hesitate to mention it because it is so rare, — that is, pigment cirrhosis or hemachromatosis. In favor of this diagnosis are the diabetes, the persistently large liver and his sex. It usually occurs in men. Another point is that the diabetes became progressively worse as time went on, more and more insulin being required to control it, although even then it did not seem to be satisfactorily controlled. I do not know, however, how well he adhered to his prescribed diet. If he was really co-operative, the apparent increase in the severity of his diabetes might be of some significance. Against the diagnosis of hemachromatosis are its rarity and the absence of any pigmentation of the skin. When first admitted there is a note about slight pigmentation of the shins, but that is not at all characteristic. Usually the pigmentation is quite general and not localized to such a small area. The absence of skin pigmentation is definitely against such a diagnosis, although we are aware that cases of hemachromatosis have existed in which there was no pigmentation of the skin or at least where none had been noted. The biggest factor against it, to my mind, is that he lived four years after the large liver and diabetes were discovered. The usual course of hemachromatosis is quite rapid — two months to a year. The fact that he lived for four years is a bit unusual, and yet I have no better explanation for this picture. Despite the arguments against it I think it is the most satisfactory type of cirrhosis to explain the picture presented here.

So far as the terminal pictures goes, I am not sure whether he had diabetic coma. The information that we have is very meager. All we are told is that he had a blood sugar of 334 mg. per cent and was drowsy. We know nothing about his urinary sugar, whether acetone or diacetic acid was present, the carbon-dioxide combining power of his blood or even his temperature. It is difficult to say whether he did or did not have diabetic acidosis or coma. We can make the diagnosis with

security, however, because Dr. Mallory cannot disprove it anatomically. The patient was drowsy and sleepy; he did have an elevated blood sugar. He was treated for diabetic coma, and I suppose that that is what he had. I shall assume that he did anyway. Just what precipitated it is rather obscure. It was probably sepsis of some sort, for that is what precipitates most attacks of diabetic coma. He had evidence of infection around his anus, and I imagine that he had either a perirectal or ischiorectal abscess. Despite adequate treatment and the fact that the blood sugar returned to a normal level he remained in a shock-like condition and died. We know that patients may not recover from diabetic coma even though the chemical constituents of their bloods return essentially to normal levels. They still may die in shock, and possibly this patient did just that.

There are several other interesting things that I should like to mention which might have contributed to his death. If he did have cirrhosis, it would be interesting to know whether he was given any morphine at the end for the control of pain and discomfort. As we know, people with cirrhosis are sensitive to morphine. Even small doses will sometimes result in coma from which they do not recover. He was treated elsewhere so we probably know nothing about the medication.

Dr. Tracy B. Mallory: He was given 1/8 gr. of morphine, followed in a few hours by 1/16 gr.

Dr. Kranes: They were small doses and probably had no ill effect. There is still another possibility. If this patient had cirrhosis he may have had a ruptured varix and may have bled internally without any evidence of bleeding. He had a low blood pressure and marked tachycardia which are consistent with internal hemorrhage. The only thing that makes it unlikely is that if the patient had hemachromatosis he probably did not have esophageal varices. They are quite uncommon with that type of cirrhosis. So I shall conclude by saying that this patient had diabetes, probably hemachromatosis with cirrhosis and with iron deposits in the pancreas, liver and other organs, and that he died in diabetic coma precipitated by sepsis of some sort, probably an ischiorectal abscess.

Dr. James H. Townsend: About the time that protamine insulin began to be popularized in this country, Hagedorn* in Copenhagen reported two cases of diabetes of severe character, with very large livers, which were reduced to normal size in the course of a few weeks under the influence of protamine insulin, which supposedly worked by keeping the blood sugar normal at all times. When protamine was available here, having seen this man and knowing about the large mass, which was presumably liver, and also realizing that he was doing poorly on regular insulin, we put him on protamine insulin hoping he might be one of those individuals in whom the liver might be reduced in size. However, it never did shrink so far as I was able to ascertain from physical examination of the abdomen. We pushed the protamine insulin up to 80 units once a day and tried giving regular insulin with it in the hope of controlling the blood sugar. He was rendered sugar free, that is, so far as his urine was concerned. He was a most co-operative, but an introspective type of person who kept a diary of everything that happened to him. He had records of four urine tests a day and of every little symptom that he noticed for the four years after the diabetes began. He did not have a sick day, felt very well and was up and about almost all the time. We never felt justified in readmitting him to the hospital for better regulation of the diabetes because he was so well and was sugar free so far as the urine went. We were always unhappy about the high blood sugar: it was seldom below 300 mg. per cent. During the latter part of his life we knew little about the fasting blood sugar. We always saw him in the middle of the morning, and the high blood sugar may have been his peak for the day, since that is the time when it is the highest in patients who are on a single dose of protamine insulin. We never saw it under 250 mg. per cent.

We believed that he was doing reasonably well. We worked on the basis that he had a large fatty liver, although the question of hemachromatosis was raised several times. Some of the consultants thought that he definitely had that disease, although there was no definite area of pigmentation of the skin that could be biopsied. Had we realized that hemachromatosis was the correct diagnosis we should not have done anything about it except to treat the diabetes.

As to the terminal event, he undoubtedly died in diabetic coma. This shows in what a delicate balance he had been although he seemed to be well. When he acquired a slight infection and omitted his insulin for two days, he quickly slipped into a very serious condition, in which he showed drowsiness, hyperpnea and a high blood sugar, and I believe there were acetone bodies in the urine. If it had not been for the acute illness he might have gone on for a long time. During the four years that he was treated here, there was no evidence of progression, that I could see, except that he did need a little more insulin.

Dr. Alfred O. Ludwig: I saw this patient when he first came to the Out Patient Department. At that time he had definite diabetic acidosis. The large liver was discovered in the hospital, and a

*Hagedorn, H. C., et al. Protamine insulinate. Acta med. Scandinav. supp. 78:678-684, 1936.

diagnosis of hemachromatosis was considered but dismissed because of the absence of skin pigmentation. I consulted the literature and found several cases in which pigmentation was absent in the skin but was found in the colon. We did not look at the colon. I followed him in the Out Patient Department and the liver decreased in size. Some observers felt that his spleen was palpable.

DR. MALLORY: There was a difference of opinion about that.

DR. HOLMES: I should think that if there was fatty degeneration of the liver the film would show foci of diminished or at least mottled density instead of homogeneous density. So in considering the two possibilities one might use the x-ray as evidence against fatty degeneration.

DR. TOWNSEND: His liver felt very hard and had a rounded edge. Purely fatty ones seem more normal in consistence and have a sharp edge.

CLINICAL DIAGNOSES

Diabetes mellitus.
Cirrhosis?
Hemachromatosis?
Periproctitis.
Left inguinal hernia.

DR. KRANES'S DIAGNOSES

Hemachromatosis.
Periproctitis.
Ischiorectal abscess?

ANATOMICAL DIAGNOSES

Hemachromatosis, involving liver, pancreas, retroperitoneal nodes, spleen, adrenals, heart and kidneys.
Coronary sclerosis with thrombosis.
(Diabetes mellitus.)
Proctitis, acute ulcerative.

PATHOLOGICAL DISCUSSION

DR. MALLORY: The postmortem showed a very large liver, weighing 3500 gm. It was diffusely and finely granular, and was a peculiar shade of reddish brown. The pancreas and the retroperitoneal lymph nodes were also very brown, so much so that without any hesitation a gross diagnosis of hemachromatosis was made. When the organs were stained with potassium ferrocyanide and hydrochloric acid they turned a brilliant blue. We found extensive hemosiderin deposits in the liver, pancreas, spleen, heart and adrenals and a moderate amount in the kidneys. There was apparently none at any time in the skin.

The terminal infection was an acute ulcerative proctitis. We did not take any cultures and do not know the nature of the organism. He did have a rather severe grade of coronary sclerosis, and there was a fairly fresh thrombosis of the left descending branch, without infarction of the myocardium.

DR. F. DENNETTE ADAMS: Was the spleen very large?

DR. MALLORY: It weighed 400 gm., just at the limit of palpability.

DR. ADAMS: Do you expect a large spleen in this disease?

DR. MALLORY: Yes, eventually: not because of iron deposits but because of the cirrhosis that goes with it and a certain amount of portal obstruction. We were not able to demonstrate varices, however.

DR. KRANES: Is this not a long survival time?

DR. MALLORY: Yes; most of our experience with hemachromatosis belongs to the preinsulin era, and the course of the diabetes was always progressive and rapid. I do not know that we should expect such rapid progression with the more adequate, modern treatment.

DR. WYMAN RICHARDSON: Did he have any ascites?

DR. MALLORY: No.

DR. JAMES H. MEANS: Did the skin show anything by chemical tests?

DR. MALLORY: Unfortunately a piece of skin was not saved.

DR. LUDWIG: He was a WPA foreman and worked out of doors, so he was always somewhat sunburned in the years during which we followed him. He never had any other pigmentation.

DR. MALLORY: Quite a number of cases never have it.

CASE 24512

PRESENTATION OF CASE

A sixty-four-year-old, married naval oiler was admitted complaining of jaundice and weakness of three and a half months' duration.

Four months prior to admission a severe intermittent itching developed over the chest, which rapidly became constant. He felt perfectly well. Two weeks later a friend stopped him and told him that his skin was yellow. In the mirror he noted that the conjunctivae and skin were dark yellow. This color became lighter and darker intermittently and on entry was much lighter than when first noted. Weakness ensued, marked fatigue and exhaustion being noted especially after doing work. There was no breathlessness. The weakness gradually disappeared, and on entry he again felt quite strong. Two months before admission his urine became dark cherry-red but soon changed to yellow-green. Two weeks later a mild diarrhea with grayish white stools was noted. The color of the stools soon changed to light yellow

and remained so until entry. The diarrhea also subsided. Two weeks before entry his ankles began to swell, the edema gradually extending to the knees. Two years before admission he weighed 205 pounds. He had gradually lost weight, so that four months before entry he weighed 169 pounds and on entry 157. His appetite remained good through the entire episode. No swelling of the abdomen was noted. There was no pain or fever. His family history was noncontributory. In his occupation he was not exposed to copper or other specific poisons, so far as he knew. For the previous two years he had been drinking about ten glasses of beer every day, but had not consumed over a quart of whiskey or other hard liquor during this entire period.

Physical examination showed a large, emaciated man with a blackish yellow, almost bronzed, skin. The skin of his legs was a lighter yellow. The sclerae were jaundiced and brownish. He was edentulous. Examination of the chest was negative. The blood pressure was 110 systolic, 82 diastolic. A hard, sharp liver edge could be felt 5 cm. below the right costal margin and extending across the midline into the left upper quadrant. Just below the right liver edge was a smooth, round, rather firm, non-tender mass, the size of a small orange, which moved with respiration. A mass was felt in the left upper quadrant which was either the spleen or the left lobe of the liver. Signs of free fluid were definitely elicited in the abdomen. The anterior rectal wall was boggy to palpation. The lower extremities showed marked pitting edema below the knees.

The temperature was 98.6°F., the pulse 90, and the respirations 20.

Examination of the urine showed a trace of diacetic acid and acetone and a large trace of bile. There was no albumin or sugar. The blood showed a red-cell count of 3,100,000, 69 per cent hemoglobin, and a white-cell count of 13,500 with 85 per cent polymorphonuclears and 1 per cent eosinophils. The serum nonprotein nitrogen was 26 mg., the protein 4.7 gm., and the van den Bergh bilirubin 27.3 mg. per cent. A bromsulfalein test for liver function showed 100 per cent retention. A blood Hinton test was unsatisfactory. A Takata-Ara test was negative. A gastric analysis showed red-brown fluid, with a 4+ guaiac test and no free acid, even after histamine. One stool was yellow, one gray and two red; three were guaiac negative and one 3+.

X-ray films of the chest showed a Ghon's tubercle on the left. The heart appeared slightly enlarged in the region of the left ventricle. The aorta was slightly tortuous and markedly elongated, with marked calcification. A flat film of the abdomen showed several dilated loops of small intestine in the right midabdomen. The spleen was not definitely visible. There was a questionable soft-tissue mass above the left sacroiliac joint. A barium enema was negative. A gastrointestinal series showed the stomach to be filled with a number of irregular masses which could not be moved within the stomach. In spite of these masses, the outline of the stomach was comparatively smooth. Only a small amount of barium trickled through the pylorus after one and a half hours. The descending portion of the duodenum was never seen filled. A repeat gastrointestinal series three days later confirmed the previous films. The second portion of the duodenum was never seen.

On the fourth hospital day a diffuse itching rash appeared on the back of the right leg. Four days later the patient's chart was still flat and he had no complaints, though he slept most of the time. No definite evidence of metastatic tumor could be found except possibly in the liver. He gradually became weaker and died on the eleventh hospital day.

Differential Diagnosis

Dr. Thomas V. Urmy: May we see the x-rays now?

Dr. Richard Schatzki: As soon as some barium flowed into the stomach it was quite obvious that there was a mass in its upper half. The mass was definitely lobulated and had some sulci on its surface. The only peculiar thing was the outline of the stomach which was apparently smooth in spite of the mass. The patient was therefore reexamined in order to exclude food or something of that sort as cause of the filling defect. This was done three days later and exactly the same lobulated mass was found. The mass was not movable by palpation, but this procedure was very inadequate on account of the high position of the mass. Only a minute amount of barium ever trickled beyond this mass and through the pylorus, and this was never sufficient to outline the duodenum. The patient, as I remember him, had a fairly prominent, hard abdomen.

Dr. Urmy: As one begins reading this history, the first thought is that we are encountering a case of common-bile-duct obstruction. We make up our minds that this is probably due to cancer of the pancreas because of the apparently palpable gall bladder and the lack of pain. Then we read on and find that the patient had ascites and a questionably palpable spleen. Is this, after all, a case of intrahepatic disease? We have the story of some alcoholic intake to raise the question of cirrhosis, but on the other hand, profound jaundice without marked constitutional symptoms leading up to ascites is a very atypical story of cirrhosis or other intrahepatic lesion.

What are the other possible causes of ascites? We read later that the serum protein was low. This was, no doubt, responsible for his edema. It could also account for the ascites. Again, metastases from cancer might through pressure cause portal obstruction. However, the record mentions no other signs of portal obstruction. Finally, we must think of carcinoma of the peritoneum, and considering the long duration of symptoms, the questionable masses here and there, and the dilated loops of small intestine later visible on x-ray and suggestive of a partial obstruction, we have a fairly strong case for it.

Of course the gastrointestinal series immediately suggests, or more than suggests, a primary lesion in the stomach. This is borne out by the gastric analysis which showed a great deal of blood and absent free hydrochloric acid. The stool examinations are less suggestive as one positive guaiac test in a slightly jaundiced patient is not unusual.

The color of the stools is interesting. At first they were clay-colored, then light yellow. Both types were consistent with obstructive jaundice. The later observation of gray stools sounds as though the pancreatic duct as well as the common bile duct were obstructed. The diarrhea early in the course of his disease may have been pancreatogenous. I think we have to believe that there was a tumor in the head of the pancreas.

The bromsulfalein test is consistent with obstructive jaundice or marked liver damage from infection or cancer. The Takata-Ara test is, of course, against cirrhosis.

With the gastric findings it seems to me most logical to suppose that the primary lesion was cancer of the stomach. The fact that the patient lost weight for over a year before he developed jaundice suggests that there was a preceding lesion. With such a diagnosis we must suppose that he had not only metastases in the liver but also extension to the head of the pancreas. The jaundice may have been a combination of intermittent obstruction in the head of the pancreas, also involving the pancreatic ducts, and obstruction in the liver itself. I believe there was metastatic involvement of the peritoneum and that this was responsible for the ascites more than was the portal obstruction.

Clinical Diagnoses

Carcinoma of the stomach, with metastases to the liver.

Obstructive jaundice.

Dr. Urmy's Diagnosis

Carcinoma of the stomach, with extension to the pancreas and metastases to liver and peritoneum.

Anatomical Diagnoses

Carcinoma of papilla of Vater, with extension to duodenum and regional lymph nodes.

Carcinomatous erosion of pancreaticoduodenal artery.

Obstruction of common bile duct.

Biliary cirrhosis.

Ascites.

Icterus.

Massive blood-clot in stomach.

Pathological Discussion

Dr. Tracy B. Mallory: The postmortem was quite a surprise to everyone. When we first opened the stomach we found a large spherical mass, — a clot of blood, — and that was the tumor. Otherwise the stomach wall was entirely normal. The duodenum showed a very large area of shallow ulceration, which on gross examination looked like a benign duodenal ulcer. I did not know at the time that the patient had gastric anacidity, otherwise I should have been more suspicious. When we inspected the papilla of Vater we found a mass that was firm, hard and slightly ulcerated and had the appearance of cancer. Subsequent microscopic examination showed that the entire ulcerated area in the duodenum had a lining of cancerous tissue. The tumor had extended upward in the mucosa from the papilla of Vater to the pylorus. In its central portion it was deeply ulcerated, and the pancreaticoduodenal artery was identified as the source of the hemorrhage. The blood went up rather than down and stayed in the stomach, apparently without significant digestion in a three-day period. I think it is unquestionably a case that if it had never been x-rayed would have been diagnosed correctly.

Dr. Schatzki: This patient's stomach contained — as described — a mass simulating a cauliflower type of carcinoma except that the stomach outline was fairly smooth. The unchanged appearance and the position of the mass after three days fairly well excluded the presence of one composed of food. Retrospectively, I think that this must be a fairly characteristic x-ray appearance of a large blood clot in a patient who for some reason does not vomit the blood and who, due to lack of hydrochloric acid, does not digest it.

Dr. Mallory: The liver was large and had the appearance of one resulting from long-standing biliary obstruction, but it did not contain many gross metastases.

Dr. Wyman Richardson: Do you attribute the ascites to the low serum protein?

Dr. Mallory: I think we must. There was tumor somewhere in the neighborhood of the portal vein, but there was no evidence of obstruction.

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CHRISTMAS, 1938

Again that season of the year has returned when our thoughts, and sometimes our actions, assume a familiar and rosy form — the Christmas pattern. Everywhere through this and probably other broad lands, similar or equivalent customs are being observed. Fir trees are being raised in living room or hall by the hundreds of thousands and are being hung with colored electric lamps by the millions; the strings of tinsel that are draped from branch to branch would, if laid in a single line, stretch from Boston to the moon, or possibly to a planet.

Molasses candy has, we hope, been pulled, despite the fact that molasses now comes wrapped in cellophane, and countless kernels of popcorn have gone through the popper, foaming like draught beer, and have been strung on cotton threads for further arboreal adornment. (We had a female cousin, in our youth, who would swallow the entire string of popcorn, head first, and then pull the thread out by its tail. The feat still amazes us in retrospect.)

Rum punches have been mingled by those more philosophic souls who believe that the spirit of Christmas enjoys also a plural form; big-footed lumbermen's socks have been pulled from the cedar chest to hang before the fireplace, come Christmas Eve; Dickens's "Christmas Carol" has been read in a million church chapels at a million candlelight services, and the Christmas pageant has been or is about to be performed in approximately as many parishes.

The Christmas season is here. Of course, it is busy; of course, we're going to be in a state of acute fatigue when it's over, but what we are going to get out of it will last the rest of the year. What *are* we going to get? Don't ask. As Santa Claus would say, it's in the bag.

TAX-SUPPORTED AND INSURANCE MEDICINE

The great increase in medical knowledge and equipment during the past fifty years has increased the cost of medical education to the doctor and the price of medical care to the patient. It has not necessarily increased the costs of illness to society as a whole. But the need has arisen for a distribution of the costs of expensive modern medicine so that an excessive burden does not fall on the sick. At the National Health Conference in Washington the consumer of medical care voiced a challenge to the medical profession to meet this need. The House of Delegates of the American Medical Association in September promptly recognized the challenge. It approved tax-supported medicine for the indigent and health insurance for those who can afford it. It appointed responsible qualified members to represent the interests of the profession at conferences with the Government on the National Health Program. Thus a beginning, and a significant one, has been made to answer one aspect of the problems before us. We

should be as thoroughly aware as possible of what has and has not been done. For this reason we print elsewhere in the *Journal* one analysis of what has recently occurred.

The principle of prepayment cost-sharing has been accepted. The application of the principle to the indigent by means of taxation and to those who can finance voluntary prepayment schemes has been approved and now awaits extension. But the means by which a distribution of the costs of medical care incurred by the large intermediate group, who are neither indigent nor financially able to pay the premiums of voluntary schemes, has still to be agreed on. Theoretically it would be wise to postpone action on this particularly difficult part of the problem and to avoid resorting to compulsion in its ultimate solution. But, will this group of consumers agree to delay? Probably this is the very group that is in most need of a distribution of costs. Yet, being unable to finance the total prepayment premiums themselves, supplementary sums are required. Can a combination of premiums, paid by the group, and of tax funds or some other such funds be accomplished without governmental assistance of some kind or other? And if governmental assistance is required will that necessarily mean a compulsory system? These are difficult questions. Let us hope that time will be provided for their proper solution. In the meantime the profession should not lightly rule them from discussion, lest solutions be arrived at without due consideration.

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY

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PLACENTA ACCRETA

A thirty-eight-year-old primipara was delivered on January 29, 1938, of an 8 lb., 10 oz., baby. One and a half hours after delivery there were no signs of separation of the placenta and examination showed it to be completely attached.

The family history was essentially negative. The patient had had influenza in 1918 and tonsillitis in 1923. She had undergone no operations. Catamenia began at twelve, were regular with a twenty-eight-day cycle until 1933 when they came every twenty-one to twenty-eight days, and lasted three or four days. Her last regular period was April 14, 1937, which made her expected date of confinement January 21.

During her pregnancy her blood pressure varied from 126 systolic, 74 diastolic, to 136 systolic, 92 diastolic, until January 11, when it rose to 150 systolic, 100 diastolic, and she had considerable edema of the feet and legs. With treatment the edema subsided. A week later her blood pressure was 148 systolic, 98 diastolic; the urine which had shown nothing abnormal before this time contained a trace of albumin. Microscopical examination revealed no abnormalities. In late pregnancy a fibroid about 5 cm. in diameter was palpable a little below and to the left of the umbilicus.

After the diagnosis of placenta accreta had been made, the patient was returned to her room. Another fibroid about 5 cm. in size was felt on the top of the fundus, and a number of others were palpable on its posterior aspect. The uterus showed good tone and seemed to be larger on the right side, where it reached almost to the rib margin. On the day following delivery the patient's blood pressure was 140 systolic, 84 diastolic, and her pulse varied from 96 to 124. There was never any blood lost through the vagina, nor was there any evidence of blood's accumulating in the uterus. To combat dehydration 2000 cc. of 5 per cent glucose in saline was given intravenously in the afternoon. Fifteen minutes after the clysis ended the patient felt chilly; an hour later her temperature was 102.8°F., pulse 135, respirations 28. Fourteen hours after delivery, with a preoperative diagnosis of placenta accreta, the patient was prepared for operation. The fundus was explored manually by the vaginal route, and numerous mural fibroids were encountered. The placenta was definitely adherent and could not be removed without using more force than was justifiable, so laparotomy was performed and a supracervical hysterectomy done. The abdomen was closed without drainage. At the close of the operation the patient's pulse was 128, and the blood pressure 120 systolic, 60 diastolic.

The patient ran a slight febrile course until the sixteenth day postoperatively. On the ninth day she began to drain through the vagina a grey,

A series of selected case histories by members of the section will be published weekly.
Comments and questions by subscribers are solicited and will be discussed by members of the section.

thin, purulent discharge, which had reduced considerably in amount by the time the patient was discharged on the twenty-first postoperative day.

The blood pressure at discharge was 108 systolic, 80 diastolic. The pathological report was as follows:

> The specimen consists of a postpartum uterus and whole placenta. The specimen measures 21 cm. transversely by 10 cm. vertically by 13 cm. anteroposteriorly. The uterus contains many fibroids. There is a large subserous fibroid, 9 cm. by 6 cm. by 6 cm., in the region of the right cornu, and another subserous fibroid, 3 cm. by 3 cm. by 1 cm., at the fundus. In the left lateral region is an intramural fibroid measuring 5 cm. by 5 cm. by 4 cm. Scattered throughout the uterine wall are six other fibroids measuring from 3 cm. by 3 cm. by 2 cm. to 1 cm. by 1 cm. by 1 cm.
>
> The placenta measures approximately 14 cm. by 13 cm. by 1.1 cm., with a section of cord attached measuring 16 cm. The placenta is firmly adherent to the uterine wall at its margins and in portions of the fundal attachment. At the fundus the wall of the uterus is 12 mm. thick, and the uterine fibers at the placental site are separated. A part of the placenta measuring 8 cm. by 8 cm. by 0.7 cm. rests in a subcornual sacculation of the uterus where the uterine wall is only 3 mm. in thickness. Gentle to firm traction on the placenta does not dislodge it.
>
> Microscopic sections show areas in which the chorionic villi are embedded both in fibrous decidua-like tissue and directly in the uterine musculature. In these areas there is a somewhat hyalinized basal plate of Rohr's fibrin stria, with complete absence of Nitabuch's layer. The decidua vera shows a paucity of glands, and the spongy layer is markedly deficient. In many areas of the placenta at its attachment are accumulations of polymorphonuclear leukocytes. There are accumulations of polymorphonuclear and round cells in the decidua vera and muscle fibers.
>
> Diagnosis: partial placenta accreta; acute inflammation of placenta; acute and chronic inflammation of decidua vera and myometrium.

Comment. The extreme conservative treatment of retained placentas unaccompanied by bleeding is perfectly illustrated in this case. After delivery and when there has been no bleeding it is wise to do nothing for the purpose of hastening the third stage of labor. The absence of bleeding means that the placenta has not separated. Such placentas may ultimately prove to be accretas or just adherent, but active treatment, which means entering the uterus, is not at all necessary so long as the symptoms of bleeding do not appear. There can be no hard and fast rule laid down as to the length of time one may wait, in the absence of hemorrhage, before intrauterine exploration. Most cases simplify the problem by exhibiting more or less bleeding, up to the point of severe hemorrhage. In such cases intrauterine exploration is immediately essential. Many men believe that if the placenta shows no signs of separation within three or four hours, intrauterine exploration is indicated; but there is never any haste until bleeding occurs.

In this case, intrauterine exploration revealed a placenta accreta. The size of the uterus, studded with fibroids, would have complicated any attempt to remove the placenta, had it been just adherent. The pathological diagnosis of accreta confirms the rationale of hysterectomy. When once the diagnosis of accreta is made, it is usual for operation to be immediately performed. In this case, as no bleeding ensued, the delay of fourteen hours made no difference in the outcome.

OBITUARY

FREDERICK WILLIAM JOHNSON
1853 - 1938

Doctor Frederick W. Johnson, of Boston, died December 3, in his eighty-sixth year. He was born in Bradford, Massachusetts, on October 24, 1853, and received his preliminary education at Dummer Academy. He was graduated from Amherst College in 1875 and received the degree of master of arts from this same college in 1878. He then entered Harvard Medical School, graduating in 1881, and subsequently served as an intern at the Boston Lying-in Hospital and the Boston City Hospital.

After completing his internships, Doctor Johnson entered the general practice of medicine in Boston. Gynecology — then a comparatively new specialty in Boston — soon attracted his special interest, and he shortly decided to confine his work to that field. His skill and ability were recognized early, and in January, 1887, he was appointed to the gynecological staff of St. Elizabeth's Hospital, and later that year to the gynecological outpatient staff of the Carney Hospital. In 1890 he was made a member of the house service of the Carney Hospital and of the staff of the Massachusetts Women's Hospital, and in 1894 became associated with the staff of St. Mary's Infant Asylum. In 1908, when the various departments of the Carney Hospital were reorganized, Doctor Johnson was appointed chief of the gynecological department, and he continued in that capacity until 1928, when he retired. He remained on the staff as a consultant and was active up to July 1, 1938. Doctor Johnson was also consultant at the Jordan Hospital, Plymouth, the Sturdy Memorial Hospital, Attleboro, and the Elliot Hospital, Manchester, New Hampshire.

He was appointed professor of gynecology at Tufts College Medical School in 1920 and held

this position until 1922. He was president of the staff of the Carney Hospital for a number of years, and as such, his advice and counsel were frequently sought in formulating changing policies to meet new conditions and improvements.

Doctor Johnson was married on July 2, 1879, and two sons and a daughter were born of this union. His daughter died in early childhood, but his widow and two sons survive him.

He was always a deep student of his specialty and wrote many articles which were published in the leading medical journals of the world. He was a founder of the American College of Surgeons and of the New England Obstetrical and Gynecological Society, a fellow of the American Medical Association and of the Massachusetts Medical Society and a member of the Boston Surgical Society and of the alumni associations of the following institutions: Boston City Hospital, Harvard Medical School, Free Hospital for Women and Boston Lying-in Hospital. He was also a member of the Boston Medical Library and the Harvard Club of Boston.

An outstanding surgeon, a gifted teacher, a true and loyal friend, Doctor Johnson endeared himself to every doctor, student, nurse and patient with whom he came in contact in his fifty-seven years of practice in Boston.

E. L. K.

DEATHS

CANEDY — Frederick S. Canedy, M.D., of Wellfleet, died December 12. He was in his seventy-first year.

Born in Taunton, he attended Taunton High School and Boston University, receiving his degree from Boston University School of Medicine in 1891. He began his practice in Providence, later moving to Winchester where he remained for several years before going to Wellfleet.

Dr. Canedy was a member of the Massachusetts Medical Society and a former member of the school committee in Wellfleet.

His widow and a brother survive him.

PIERCE — Willard H. Pierce, M.D., of Bernardston, died September 24. He was in his seventy-sixth year.

Born in Westminster West, Vermont, he attended Saxtons River Preparatory School and received his degree from the University of Vermont College of Medicine in 1885. He settled in Bernardston the same year and later opened an office in Greenfield. Dr. Pierce was the founder of a private hospital in Bernardston which was later made a part of the Franklin County Hospital.

He was a member of the American Medical Association, the Massachusetts Medical Society, the Connecticut Valley Medical Association and the American College of Surgeons.

His widow survives him.

MISCELLANY

THE NATIONAL HEALTH PROBLEM

The following statement was recently released by the Committee of Physicians for the Improvement of Medical Care, Incorporated:

The National Health Conference

an analysis of the problem of medical care

There has been general agreement in the reports of all bodies which have examined the state of health services both here and abroad with respect to the major deficiencies of systems for the provision of medical care and the directions which remedial measures must take:

I. From the standpoint of income and costs, the population may be divided into three or four classes:

1. Those who are able from their own resources to purchase all the medical care they require. For members of this group no provision need be made except for their education in matters of health.
2. Those at the other end of the scale, who cannot afford to pay anything for medical care. For this class provision must be made at public expense.
3. Those between the wealthy and the truly needy, who can, as individuals, from their own resources meet some, but not all, costs of medical care. This group may be divided into two classes:

a. Those who have a sufficient margin of economic safety to meet all the costs of medical care by cost-sharing methods. In theory, at least, the needs of this class can be met by voluntary cost-sharing methods (insurance, co-operatives, and so forth).

b. Those whose margin of competence is so small that they cannot meet all the costs of medical care by voluntary cost-sharing methods. The needs of this group can be met only by supplementary aid.

II. The essential components of a comprehensive program to provide medical care for the whole population are:

1. Adequate public-health services correlated with medical services for the individual. These must include protection of the populace against environmental factors deleterious to health and against injurious influences resulting from disease among their fellow citizens.
2. Services of medical practitioners.
3. Diagnostic and therapeutic facilities and the services of competent specialists.
4. Sufficient hospitals, adequately equipped and staffed, conveniently distributed, and so financed that hospital accommodations and facilities will be available to the whole population.
5. Cash disability benefits or other measures to compensate the worker for economic loss incurred by reason of inability to work because of illness or physical disability.

III. To implement and integrate such a program there must be:

1. Consolidation of government health services to assure correlation of all agencies contributing to public health and medical care.
2. Measures to correlate activities of practitioners, diagnostic and therapeutic facilities, specialists and hospitals (see II, 3, 4 and 5). Non-profit groups seem to be promising methods for these purposes.
3. Generous provisions for the support of education and investigation. Any comprehensive program will require more trained experts of every kind than are now available. In addition, if the highest quality of service is sought, not only must the fundamental educational background be improved but opportunities for continuing education must be given to assure the proper utilization of discoveries with a minimum of lag. Investigation to accelerate the progress of medicine must be promoted.
4. Some means to assure high quality in physical facilities and to obtain and maintain exemplary standards of competence and conduct in personnel. These ends can probably be achieved only by the establishment of impartial boards of some kind, composed of experts, with advisory powers, at least. It may well be advisable to link this feature with the educational part of the program.

APPRAISAL OF THE PROGRAM OF THE TECHNICAL COMMITTEE AT THE NATIONAL HEALTH CONFERENCE HELD IN WASHINGTON, JULY 18 TO 20, 1938

Judged by the above criteria the program of the Technical Committee is, in the opinion of your committee, a sound contribution to the solution of the problem of medical care. It is based on careful investigation. It recognizes the implications of the economic status of the population. It proposes care of the needy at public expense, cost-sharing or tax-supported care for the middle class, cash disability benefits to compensate for unemployment due to illness or disability. Its provisions include all the essential components of medical care that are mentioned under II above. It contemplates evolutionary development, with initiative and control to be entrusted to state and local governments. It recognizes the desirability of retaining and strengthening useful existing institutions and facilities. Estimates of expenditures and divisions between economic categories, admittedly tentative, may be open to criticism and change; but the program as a whole is wisely devised, if the initial premise, that efforts should be made to provide medical care to all the people of the United States, is accepted.

The most serious defects of the proposals of the Technical Committee are the omission of provisions for education and investigation and the failure to demand the consolidation of federal health services. However, they do offer a well-organized framework upon which an excellent program could be built with the co-operation of physicians and other groups.

Efforts of these groups should be centered especially on the consideration and development of the methods by which the program may be implemented and integrated (see III above). They must insist that sufficient funds be provided by appropriate means to give to the people the essential components of medical care mentioned in II. The economic and financial features mentioned in I should concern them as citizens, rather than as physicians. They must be alert lest technics of finance prejudice methods by which medical care is organized and administered. They must not, however, allow fear of such prejudice to close their minds to the economic implications of the situation. Sociological, economic and geographical variability necessitates diversity of formulas of finance as well as formulas of administration. It is unwise, therefore, to enjoin, because of preconceptions, any particular method for raising funds. If major attention is given to the perfection of plans for the application of these funds, the means by which they are raised will be of minor import.

The most notable result of the conference, viewed in retrospect, is the effect it had in augmenting interest in problems of health throughout the country. Almost every journal in the nation, professional and lay, has had something to say about the subject. Many of them have given long accounts and impressions of the conference. Symposiums and questionnaires have multiplied. The Republican Platform Committee held a special meeting on health insurance. Organizations of every kind have staged meetings to discuss it. Out of the welter of opinion come certain impressions. Despite some protests against the estimated expenditures by the government, the public is receptive to, if not insistent on, changes in the system of medical care. It is appreciative of its responsibility to support care for the needy, including payment of physicians. Although laymen sympathize with the general desire of physicians to uphold their professional status and standards, it is hard for them to understand the opposition of the organized medical profession to prepayment cost-sharing systems to provide services to those with small or moderate incomes.

ACTION OF THE HOUSE OF DELEGATES OF THE AMERICAN MEDICAL ASSOCIATION AT THE SPECIAL SESSION HELD IN CHICAGO, SEPTEMBER 16, 1938

At the special meeting of the House of Delegates of the American Medical Association preliminary speeches by the officers upheld the present system. Resolutions presented by component societies of the association exhibited various shades of opinion, from sweeping condemnation of the Government and a demand for complete retention of the *status quo* to expressions of sympathy toward government aid coupled with apology for the apparent indifference of organized medicine. Most of the programs proposed the use of government funds but confined their attention to the absolutely needy. One, at least, contemplated ultimately "a prepayment cost payment plan for medical and dental care" for the low-income class above the level of true indigence.

The committee to which the subject was referred finally brought in resolutions on the National-Health-Conference program that were adopted by the House of Delegates. Proposals 1, 2 and 3, dealing with expansion of public-health activities and hospital facilities and medical care for the medically needy, were accepted in principle, although certain conditions were added. "The establishment of a federal department of health with a secretary who shall be a doctor of medicine and a member of the President's Cabinet" was recommended. It was stipulated that, "any expenditures made for the expansion of public health and maternal and child health services should not include the treatment of disease except so far as this cannot be successfully accomplished through the private practitioner." The need of utilizing and supporting existing hospital facilities was stressed. In connection with medical care for the medically needy, government aid was welcomed, "provided, first, that the public welfare administrative procedures are simplified and co-ordinated; and, second,

that the provision of medical services is arranged by responsible local public officials in co-operation with the local medical profession and its allied groups. . . . In each state a system should be developed to meet the recommendation of the National Health Conference in conformity with its suggestion that 'the role of the federal government should be principally that of giving financial and technical aid to the states in their development of sound programs through procedures largely of their own choice.'" Except for the demands for a federal department of health, these special clauses stress conditions contained in the Government's proposals.

Proposal 5, recommending cash disability benefits, was also endorsed with the proviso "that the attending physician be relieved of the duty of certification of illness and recovery."

Concerning Proposal 4, on a general program of medical care, the resolutions are unequivocal in only one respect, the refusal to accept compulsory health insurance. The reasons given are "that it is a complicated bureaucratic system, which has no place in a democratic state. It would undoubtedly set up a far-reaching tax system with great increase in the cost of government. That it would lend itself to political control and manipulation there is no doubt." It suggests that the needs of the middle class may be met by extension of hospital insurance and workmen's compensation laws and the development of cash indemnity insurance plans to cover, in whole or in part, the costs of emergency or prolonged illness. Hospital insurance is to be confined "to provision of hospital facilities and should not include any type of medical care." With respect to cash indemnity insurance, it is stated that "agencies set up to provide such insurance should comply with state statutes and regulations to insure their soundness and financial responsibility and have the approval of the county and state medical societies under which they operate." With these conditions and on the grounds "that health needs are not identical in different localities but that they usually depend on local conditions and therefore are primarily local problems . . . county or district medical societies, with the approval of the state medical society of which each is a component part, [are encouraged] to develop appropriate means to meet their local requirements."

Finally, it was recommended that, to facilitate the accomplishment of these objectives a committee of not more than seven physicians representative of the practicing profession, under the chairmanship of the president of the American Medical Association, be appointed to confer and consult with the proper federal representatives relative to the proposed National Health Program.

INTERPRETATION OF THE ACTION OF THE HOUSE OF DELEGATES

In effect, the House of Delegates appears to have taken the attitude that the defects in the present health services cannot be attributed to the methods by which medical care is provided by physicians. Extension of public-health services is to be encouraged, if it does not encroach on the private practice of medicine. The appropriation of funds to provide medical care for the medically needy is welcomed. In the section which discusses this subject reference is made to the "good quality of medical care now provided" and it is urged that "the methods and practices which have brought us to this present high plane" may be "continued and approved."

There is no attempt to treat comprehensively the problems of the middle class. Compulsory health insurance is enjoined; tax-supported aid is not mentioned. The reasons advanced against compulsory health insurance omit consideration of its effects on medical care. Although they have been accepted in relation to the care of the needy and to workmen's compensation laws with equanimity, bureaucracy and other evils arising from the intervention of the government in financial relations become suddenly menacing at this point. Voluntary insurance is accepted with conditions that greatly limit its applicability and utility. For the aid of the marginal class to which voluntary insurance is unsuitable, nothing is suggested.

On the subject which is most urgently the responsibility of the medical profession, improvement of the quality of medical care, the recommendations of the House of Delegates are silent. Consolidation of the health services of the government is recommended. With this exception, the items listed under III in the outline above are not mentioned. Efforts to bridge the gap between scientific knowledge and its application are not recommended. The necessity for new machinery to correlate services of general practitioners and specialists and to make the latter more generally available is not recognized. Education and investigation are neglected.

ATTITUDE OF THE COMMITTEE OF PHYSICIANS TOWARD THE PROGRAM OF THE TECHNICAL COMMITTEE

It is the opinion of the Committee of Physicians that the National Health Conference has had an important and beneficial effect on the movement for the improvement of medical care. It has tended to establish contacts between the various interests concerned in the solution of this problem. It has provoked thought and discussion of the subject throughout the country, and from this thought and discussion physicians and laymen are acquiring a more intelligent appreciation of the defects of medical care and methods for their correction. It has publicized statistical data on the economic status of the population, the incidence of illness and the health services. Finally it has offered a comprehensive plan for the improvement of the health and medical care of the whole population adapted to correct the major defects that are generally recognized in the present system of medical care. This plan offers a basic structure for the development of programs.

The committee believes that the first two proposals of the Technical Committee, dealing with extension of public-health services and expansion of hospital facilities, should be adopted. Measures to implement them should be devised. It is especially important that these include means to assure economy and efficiency in administration and the highest standards of competence and conduct in personnel. Present estimates of needs and costs should be considered as tentative. Existing facilities, public and private, should be utilized so far as possible.

The committee favors adoption of Proposal 3, dealing with medical care for the medically needy, with the same conditions as those suggested in connection with the first two proposals. Adequate remuneration of physicians for their services is essential. It is imperative, however, that plans be drawn to secure centralization of physical facilities, co-ordination of administrative machinery and co-operation of professional personnel in the interests of economy and efficiency.

The principles embodied in Proposal 4, dealing with a "General Program of Medical Care," are necessary to any program that contemplates provision of medical care to all the people. The committee believes that in the consideration of health insurance the relative merits of voluntary and compulsory systems must be weighed. The committee agrees with the Technical Committee in not advocating the immediate imposition of compulsory health insurance on the country at large, but it feels that it is a mistake to exclude from consideration a method which has been so

extensively employed. In any adaptation of compulsory insurance in the United States, efforts should be made to avoid the defects which have been discovered in Britain and on the European continent. The only alternative to meet the needs of the marginal class immediately above the level of true need is a tax-supported system. The Technical Committee is correct in stating that each method — compulsory health insurance or tax-supported aid — may have especial advantages in particular circumstances. Voluntary hospital insurance should be encouraged and should be extended to include medical services. Without this its utility is limited. Means can be found to obviate the exploitation of physicians by hospitals under such a system. Voluntary insurance for general medical care is also highly desirable to meet the needs of the upper middle class. Its development need not wait on the adoption of a comprehensive program. To facilitate such development, legislative action to alter existing insurance laws may be necessary. Care should be taken that these legislative changes do not remove from physician and patient protection against exploitation by a third party, that they do not violate sound actuarial principles, and that they do not relieve the physician of personal liability for negligence or improper conduct. Benefits, under these insurance systems, should not be limited to the services of a general practitioner, but should include domiciliary care, the services of specialists and other accessories which are essential to medical care of high quality. Sound experiments on a non-profit basis are especially to be encouraged, because they appear to promise more than commercial organizations can offer.

Proposal 5, to cover loss of wages during sickness, is wisely treated by the Technical Committee as a separate problem. Without compensation for the economic loss imposed by illness, the best medical care cannot be provided. So far as possible, physicians should be relieved of responsibility for the administration of this phase of the program.

Major attention of physicians should be directed to the development of methods by which, under any system, the quality of care may be improved. The Committee of Physicians believes that:

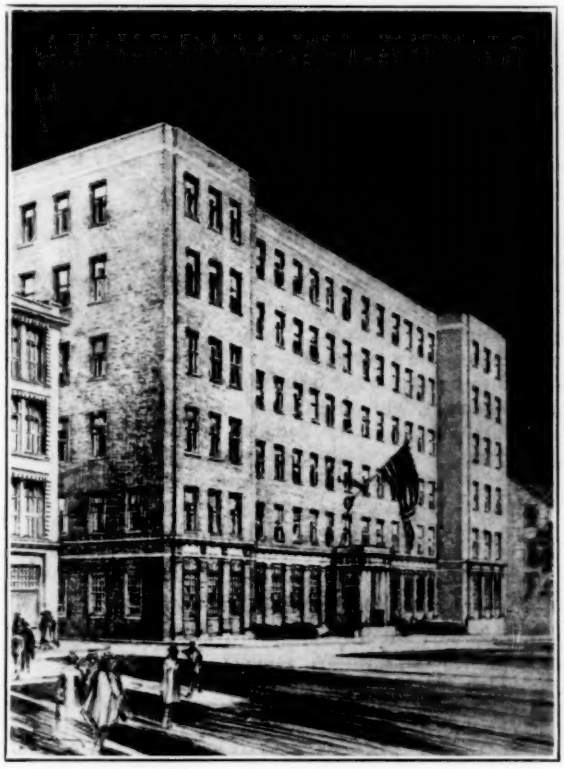
1. Govermental health services should be consolidated.
2. Efforts should be made to secure better co-ordination of health services. It does not believe that individualized competitive practice has proved itself a completely efficient or economical means of furnishing to all the people all the components of modern medical care. It believes that experiments in co-operatives and non-profit group practice should be encouraged, not obstructed.
3. Machinery must be devised by which standards of administrative and professional competence and conduct may be established and maintained. If such machinery is made available there would be little reason to obstruct, by punitive measures, experiments in the provision of medical care. It is self-evident that in any machinery of this kind consumer as well as physician must be represented. Moreover, other professional groups engaged in associated welfare activities must also be included. Those matters which pertain to the actual ministrations of physicians must be under the control of physicians because they alone have the necessary expert knowledge. The medical profession should not be burdened with the administrative and financial responsibilities, but should be freely consulted and should have a voice therein.
4. Generous provisions must be made for education and investigation. Without these, medical care of the highest quality and continuous improvement of quality cannot be achieved. Philanthropy cannot be expected to meet the demands of a comprehensive program of medical care. Nor can the support of education be covered by fees collected from the sick. Advance of knowledge and improvement of the quality of medical care benefit all groups, and responsibility for their support should, therefore, be assumed by the population as a whole.

JOHN P. PETERS, M.D., *Secretary.*

789 Howard Avenue,
New Haven, Connecticut

THE JOSEPH H. PRATT DIAGNOSTIC HOSPITAL

The new Joseph H. Pratt Diagnostic Hospital of the Boston Dispensary had its invitation opening day on Thursday, December 15, from 10 to 5 o'clock. The six-story and basement red-brick building with white entrance columns and stone trim is of modified Georgian architecture. The hospital, which has a 145-foot frontage on Bennet Street, was made possible by a gift from William Bingham, 2d, of Bethel, Maine, for the further development of the medical program of the Bingham Associates Fund, of which Dr. George B. Farnsworth is president. It adds another unit to the New England Medical Center, which includes the Boston Dispensary on Bennet Street, the Floating Hospital on Ash Street and the Tufts College Medical School.



Architects, Harry J. and John E. Carlson.

Joseph H. Pratt Diagnostic Hospital.

The new diagnostic hospital is named in honor of Dr.

Joseph Hersey Pratt, physician-in-chief of the staff, on whose sixty-fifth birthday, December 5, 1937, the cornerstone of the building was laid. Dr. S. J. Thannhauser is associate chief, and Dr. Samuel H. Proger, medical director of the hospital, which has a large staff of specially trained personnel. Frank E. Wing, director of the Boston Dispensary, is administrator.

Members of medical and health societies, hospital superintendents, board members, alumni of Tufts College Medical School and friends were invited to inspect the modern building and to have afternoon tea in the medical library on the first floor. No patients will be admitted, however, until January 1.

As part of the broad program of the Bingham Associates Fund for extending medical advantages, the hospital is prepared to offer facilities to the physicians of New England for the special study of diagnostic problems. Patients are admitted only for intensive study or for short-time specialized treatment, the average stay being slightly over six days. The new hospital will take the place of the small diagnostic hospital in the Boston Dispensary and will make it possible to accept about 65 instead of only 20 patients at a time for study of obscure medical problems. There will be private, semi-private and ward patients, with a limited number accepted free.

Because of the nature of its work the new building has more laboratory facilities than an ordinary hospital; there is a large lecture hall in the basement with tiers of seats for clinical conferences and demonstrations. On the first floor, in addition to the medical library and reception hall, there are administrative offices and a suite of physicians' private offices. Complete diagnostic x-ray facilities and routine, bacteriological, chemical, teaching and research laboratories are on the second floor, as well as a metabolism room and a minor operating suite for biopsies and similar procedures. The third floor is unfinished and is being reserved for the future use of Tufts College Medical School. The three remaining floors are for the accommodation of patients. The fourth floor is for ward and semi-private patients and has 29 beds grouped 2, 3, 4 and 5 to the room; the fifth floor is for private and semi-private patients, with single and two-bed rooms for 20 patients; and the top floor is designed for 14 private patients, each room with a private bath.

MAINE NEWS

SERVICES FOR CRIPPLED CHILDREN

The winter and spring schedule for clinics for crippled children is as follows:

Rumford: Rumford Community Hospital, 1:00 to 3:00 p. m., Wednesday, January 25, March 29 and May 24.

Machias: Washington State Normal School, 1:00 to 3:00 p. m., Wednesday, January 18 and April 26.

Lewiston: Central Maine General Hospital, 9:00 to 11:00 a. m., Saturday, January 28, February 25, March 25, April 29, May 27 and June 24.

Bangor: Eastern Maine General Hospital, 1:00 to 3:00 p. m., Thursday, January 12, February 9, March 9, April 6, May 4, June 1 and June 29.

Portland: Children's Hospital, 9:00 to 11:00 a. m. and 1:00 to 3:00 p. m., Monday, January 9, February 13, March 13, April 10, May 8 and June 12.

Presque Isle: Northern Maine Sanatorium, 9:00 to 11:00 a. m. and 1:00 to 3:00 p. m., Tuesday, May 16.

Rockland: Knox County Hospital, 1:30 to 3:00 p. m., Thursday, February 23 and June 15.

Waterville: Thayer Hospital, 1:30 to 3:00 p. m., Wednesday, February 1, March 22 and May 31.

NOTES

The county society secretaries in session at the Central Maine General Hospital, Lewiston, on November 4, voted to endorse the proposal whereby the Committee on Graduate Education is to map out a program of educational meetings to be held for the county societies. This program will be presented before the House of Delegates at the June, 1939, meeting and, if approved, will be effective in the fall of 1939.

On Friday, December 9, the annual meeting of the Cumberland County Medical Society was held at the Eastland Hotel, Portland. Dr. Maxwell E. MacDonald, of Boston, spoke on "Emotions and Bodily Changes."

On Thursday, December 15, the monthly meeting of the Kennebec County Medical Society was held at the Augusta State Hospital. Dr. A. Warren Stearns, of Boston, spoke on "Medicolegal Problems."

On Friday, December 16, a teaching clinic was held at the Central Maine General Hospital in Lewiston. From 9:30 to 11:00 there were case presentations, and from 11:00 to 12:00 Dr. Priscilla White, of Boston, read a paper on "Diabetic Children and Pregnancy Complicating Diabetes." From 2:30 to 5:00 there were case presentations, and at 8:00 Dr. E. P. Joslin, of Boston, read a paper on "The Prevention and Treatment of Diabetes."

Dr. Jack Spencer announces the opening of an office at 31 Deering Street, Portland, in association with Dr. Langdon T. Thaxter. He has held the following appointments: assistant roentgenologist, Collis P. Huntington Memorial Hospital; research fellow in roentgenology, Harvard Medical School; assistant roentgenologist, Massachusetts General Hospital; and consultant in radiology, Palmer Memorial Hospital and Boston Dispensary.

RÉSUMÉ OF COMMUNICABLE DISEASES IN MASSACHUSETTS FOR OCTOBER, 1938

DISEASES	OCT. 1938	OCT. 1937	FIVE-YEAR AVERAGE*
Anterior poliomyelitis	5	19	60
Chickenpox	390	291	325
Diphtheria	18	4	46
Dog bite	780	729	682
Dysentery, bacillary	19	4	4
German measles	11	24	32
Gonorrhea	416	445	581
Lobar pneumonia	232	308	235
Measles	236	88	174
Meningococcus meningitis	5	6	6
Mumps	204	154	199
Paratyphoid B fever	4	1	0
Scarlet fever	276	372	455
Syphilis	400	424	434
Tuberculosis, pulmonary	233	243	280
Tuberculosis, other forms	35	27	35
Typhoid fever	3	11	13
Undulant fever	1	9	5
Whooping cough	376	420	491

*Based on figures for preceding five years.

RARE DISEASES

Anterior poliomyelitis was reported from: Danvers, 1; Leverett, 1; Northampton, 1; Salem, 1; Whately, 1; total, 5.

Diphtheria was reported from: Boston, 5; Cambridge, 3; Fall River, 2; Lawrence, 6; Somerville, 1; Tewksbury, 1; total, 18.

Dysentery, bacillary, was reported from: Danvers, 12; Everett, 1; Lowell, 5; West Springfield, 1; total, 19.

Infectious encephalitis was reported from: Waltham, 1; Watertown, 1; Whitman, 1; total, 3.

Meningococcus meningitis was reported from: Fall River, 3; Foxboro, 1; Westfield, 1; total, 5.

Paratyphoid B fever was reported from: Danvers, 1; Holyoke, 1; Lynn, 1; North Reading, 1; total, 4.

Pellagra was reported from: Brockton, 1; Everett, 1; total, 2.

Septic sore throat was reported from: Boston, 1; Bridgewater, 1; Malden, 1; New Bedford, 1; Salem, 1; Westfield, 1; total, 6.

Tetanus was reported from: Natick, 1; South Lincoln, 1; total, 2.

Trachoma was reported from: Pittsfield, 1; total, 1.

Trichinosis was reported from: Boston, 2; Marblehead, 1; total, 3.

Typhoid fever was reported from: Holyoke, 1; Marlboro, 1; Norwell, 1; total, 3.

Undulant fever was reported from: Montague, 1; total, 1.

Typhoid fever showed record low incidence. Chickenpox, measles and mumps were reported above the five-year average. German measles was reported at a record low figure. Scarlet fever continued to show low incidence.

Pulmonary tuberculosis showed record low incidence. Lobar pneumonia, whooping cough, diphtheria, meningococcus meningitis and anterior poliomyelitis were reported below the five-year average. Tuberculosis (other forms) was reported at a figure equal to the five-year average. Paratyphoid B fever showed record high incidence.

Animal rabies continued to show low incidence. A new focus was noted in Norwood. Two cases of animal rabies were reported from Saugus.

CORRESPONDENCE

MISSING PAPERS

To the Editor: After moving into a new office a few weeks ago, I discovered that the following papers had been lost or stolen:

Harvard College diploma, 1923.
Harvard Medical School diploma, 1927.
Massachusetts Board of Registration in Medicine certificate, 1927.
Certificate of resident internship at the Sarah Morris Children's Hospital of the Michael Reese Hospital, Chicago, 1928-1929.
Massachusetts Medical Society certificate, 1929.

HAROLD J. FREEDMAN, M.D.

483 Beacon Street,
Boston.

BLOOD CULTURES IN CASES OF PNEUMONIA

To the Editor: With the rapid approach of the pneumonia season, the Department of Public Health feels it is well to re-emphasize the importance of blood cultures in cases of pneumococcal pneumonia. Bacteremia occurs in about one quarter of Type 1 and one third of Type 2 cases. When the pneumococci have invaded the blood stream, the prognosis becomes very grave. In bacteremic Type 1 and Type 2 cases, the fatality rate is four to five times as great as that in cases with negative blood cultures. This high rate may be much reduced by antipneumococcus serum provided that larger doses are administered. Accordingly the blood culture is not only of prognostic value but also one of the most important guides to dosage.

It is highly desirable to take a blood culture in each case before the first dose of serum is given. If the blood culture is positive, serum should be administered until the cultures become negative. If negative and the progress of the case is unsatisfactory, it is desirable to continue to take blood cultures at intervals of twenty-four hours or less.

Occasionally the typing of the blood culture may afford a valuable check on the sputum typing. If there is a difference, the type of pneumococcus found in the blood stream should be considered the causative organism and the one against which serum therapy should be directed. This becomes increasingly important as serums for the rarer (higher) types are made available. Pneumococci of such types are frequently encountered in sputum but are less frequently the cause of pneumonia. Early in the disease they may be reported from sputum and one of the commoner types, the real etiologic agent, may be missed. Thus blood cultures meet the challenge for more accurate etiologic diagnosis.

The Department of Public Health has made arrangements with approved typing laboratories to furnish blood-culture outfits to physicians who are treating cases of pneumonia in the home. These arrangements were completed and were announced by Dr. H. D. Chadwick in February, 1938 (Serum treatment of pneumonia. *New Eng. J. Med. 218*:336, 1938). Prior to this announcement facilities for taking blood cultures were, for the most part, available only in large hospitals.

It is encouraging to note that in the Massachusetts series of cases for July 1, 1937, to June 30, 1938, there was a substantial increase in the percentage of blood cultures taken over that recorded for earlier series. In the 1341 cases of Types 1, 2 and 5 treated from 1931 through June, 1937, only 635, or 47.4 per cent, had blood cultures done. In the 1937-1938 series of 550 Types 1, 2, 5, 7 and 8 cases (as yet unreported) a blood culture was taken in 59.3 per cent, an increase of almost 12 per cent.

In order to aid Massachusetts physicians in reaching the best attainable goal in serum therapy, it would seem important to make more widely known the fact that blood culture outfits are available at approved typing laboratories throughout the State. These outfits may be taken to the home, where 2 to 5 cc. of patient's blood may be added. They are then to be returned to the same laboratory for incubation and typing. Furthermore, if the patient is unable to pay the usual laboratory fee for such an examination, arrangements may be made at the approved laboratory for doing the work free of charge to the patient. In such an event, payment will be made to the laboratory by this department.

ALTON S. POPE, M.D., *Deputy Commissioner,*
Massachusetts Department of Public Health.

State House,
Boston

NOTICES

AMERICAN BOARD OF OPHTHALMOLOGY

The American Board of Ophthalmology announces an important change in its methods of examination of candidates for the board's certificate.

Examinations will be divided into two parts. Candidates whose applications are accepted will be required to pass a *written* examination which will be held simultaneously in various cities throughout the country approximately sixty days prior to the date of the *oral* examination.

The *written* examination will include all the subjects previously covered by the practical and oral examinations.

Oral examinations will be held at the time and place of

the meeting of the American Medical Association and of the American Academy of Ophthalmology and Otolaryngology, and occasionally in connection with other important medical meetings. The *oral* examination will be on the following subjects: external diseases, ophthalmoscopy, pathology, refraction, ocular motility, practical surgery.

Only those candidates who pass the *written* examination and who have presented satisfactory case reports will be permitted to appear for the *oral* examination.

Examinations scheduled for 1939: *written,* March 15 and August 5; *oral,* St. Louis, May 15, and Chicago, October 6.

Applications for permission to take the *written* examination March 15 must be filed with the secretary not later than February 15.

Application forms and detailed information should be secured at once from Dr. John Green, *Secretary,* 6830 Waterman Avenue, St. Louis, Missouri.

CONSULTATION CLINICS FOR CRIPPLED CHILDREN IN MASSACHUSETTS, UNDER THE PROVISIONS OF THE SOCIAL SECURITY ACT

Clinic	Date	Orthopedic Consultant
Haverhill	January 4	Arthur T. Legg
Lowell	January 6	Albert H. Brewster
Salem	January 9	Harold C. Bean
Gardner	January 10	Mark H. Rogers
Brockton	January 12	George W. Van Gorder
Pittsfield	January 16	Francis A. Slowick
Springfield	January 18	Garry deN. Hough, Jr.
Worcester	January 20	John W. O'Meara
Fall River	January 23	Eugene A. McCarthy
Hyannis	January 24	Paul L. Norton

UNITED STATES CIVIL SERVICE EXAMINATIONS

Associate Physiologist, $3,200 a Year

The United States Civil Service Commission announces an open competitive examination for the position named above. Applications must be on file with the United States Civil Service Commission at Washington, District of Columbia, not later than January 10.

Applicants must have successfully completed a full four-year course leading to a bachelor's degree (including at least twenty-four semester hours of biological sciences) in a college or university of recognized standing. They must have had at least three years of postgraduate study in advanced physiology, or at least three years of research experience in the field of physiology, or a combination of this three-year requirement.

The necessary forms may be obtained from the secretary, Board of United States Civil Service Examiners, at any first-class post office, or from the United States Civil Service Commission, Washington, District of Columbia.

Biometrician, $3,800 a Year
Associate Biometrician, $3,200 a Year
Assistant Biometrician, $2,600 a Year

The United States Civil Service Commission announces open competitive examinations for the positions named above. Applications must be on file at Washington, District of Columbia, not later than January 10. The necessary forms may be obtained from the secretary, Board of United States Civil Service Examiners, at any first-class post office, or from the United States Civil Service Commission, Washington, District of Columbia.

SOCIETY MEETINGS AND CONFERENCES

Calendar of Boston District for the Week Beginning Monday, December 26

Tuesday, December 27

*10 a. m. - 12:30 p. m. Tumor clinic. Boston Dispensary.

Wednesday, December 28

*12 m. Clinicopathological conference. Children's Hospital amphitheater.

Thursday, December 29

*10:30 a. m. Psychiatric Rounds. Boston City Hospital. Rounds will start at Room 916 on the ninth floor of the Medical Building.

Friday, December 30

*10 a. m. - 12:30 p. m. Tumor clinic. Boston Dispensary.

*Open to the medical profession.

December 28-30 — Symposium on Mental Health. Page 937, issue of December 8.

January 4-24 — Consultation Clinics for Crippled Children in Massachusetts, Under the Provisions of the Social Security Act. Notice above.

January 8 - March 26 — Lectures at the Faulkner Hospital. Page 971, issue of December 15.

January 11 — Eastern Section of the American Laryngological, Rhinological and Otological Societies in conjunction with the New England Oto-Laryngological Society. Massachusetts General Hospital.

January 12 — Pentucket Association of Physicians, 8:30 p. m., Hotel Bartlett, 95 Main Street, Haverhill.

January 12 — Peter Bent Brigham Hospital. Clinic conducted by Dr. Christian. Page 633, issue of October 20.

February 4, May 15 and 16 — American Board of Obstetrics and Gynecology. Page 451, issue of September 22. (*Application for admission to Group A examinations must be on file in the Secretary's office by March 15, instead of April 1 as previously stated.*)

February 15, March 15, May 15, August 5 and October 6 — American Board of Ophthalmology. Page 1013.

March 13 — Fourth Annual Postgraduate Institute. Page 938, issue of December 8.

March 27-31 — American College of Physicians. Page 36, issue of July 7.

May 7-15 — International Congress of Military Medicine and Pharmacy. Page 501, issue of September 29.

May 15-16 — American Board of Obstetrics and Gynecology, Inc. Page 937, issue of December 8.

May 15-19 — American Medical Association, St. Louis, Missouri.

June 6, 7, 8 — Massachusetts Medical Society. Worcester.

June 26-29 — National Tuberculosis Association. Page 936, issue of December 8.

September — Boston Psychoanalytic Institute. Page 450, issue of September 22.

September 11-15 — American Congress on Obstetrics and Gynecology. Page 938, issue of December 8.

September 15-28 — Pan-Pacific Surgical Association. Page 863, issue of November 24.

District Medical Societies

ESSEX SOUTH

January 4 — Danvers State Hospital. Clinic at 5 p. m. Dinner at 7 p. m. Speaker: Dr. Kenneth J. Tillotson. Subject: The Psychiatrist's Viewpoint in Delinquency.

February 8 — Essex Sanatorium, Middleton. Clinic at 5 p. m. Dinner at 7 p. m. Speaker: Dr. Edward Churchill. Subject: Surgical Treatment of Pulmonary Suppuration.

March 1 — Lynn Hospital. Clinic at 5 p. m. Dinner at 7 p. m. Speaker: Dr. John Rock. Subject: Endocrinology.

April 5 — Addison Gilbert Hospital, Gloucester. Clinic at 5 p. m. Dinner at 7 p. m. Speaker: Dr. Ethan Allan Brown. Subject: Allergy.

May 10 — Annual meeting. Salem Country Club, Peabody.

SUFFOLK

January 25 — Symposium on Diabetes. Dr. Elliott P. Joslin and associates, Boston Medical Library, 8:15 p. m.

March 29 — Joint meeting with New England Pediatric Society, Boston Medical Library, 8:15 p. m. Program and speakers to be announced.

April 26 — Annual meeting in conjunction with Boston Medical Library, at 8:15 p. m. Election of officers. Program and speakers to be announced.

WORCESTER

January 11 — Worcester City Hospital.

February 8 — Worcester State Hospital.

March 8 — Worcester Memorial Hospital.

April 12 — Worcester Hahnemann Hospital.

May 10 — Worcester Country Club — Annual meeting.

With the exception of the annual meeting in May, all the meetings begin with a supper at 6:30 p. m., which is followed at 7:30 p. m. by the business and scientific sessions.